AUTOMOBILE

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The Automobile

Vol. XXXV New York—Thursday, July 20, 1916—Chicago No. 3

Nash Takes Over Jeffery

Together with Lee, Higginson & Co., Purchases Entire Stock of Company

Kenosha, Wis., July 14—C. W. Nash, who is just retiring from the presidency of the General Motors Co., and Lee, Higginson & Co., of Boston, who financed the General Motors Co. several years ago, have purchased the entire stock of the Thomas B. Jeffery Co., makers of passenger and commercial vehicles. The purchase price is said to involve about $9,000,000, which would mean about $300 per share, as the Jeffery company is capitalized at $3,000,000.

To Continue Line

Mr. Nash retires from the business of the General Motors Co. on Aug. 1 and after that date will take up active management of the Jeffery business. At a recent meeting of the department heads of the Jeffery company, at which Mr. Nash was present, plans were made for the active continuance of passenger cars and trucks. Charles T. Jeffery, Harold W. Jeffery and Thomas M. Kearney, who make up the present board of directors, will continue on the board, at least for the present.

Another Combine Possible

No further details could be secured from Mr. Nash, and probably none will be made public until after the next meeting, which will be held in Boston on July 19. Predictions, however, are being made that the connection of Mr. Nash with the Eastern banking syndicate means the re-entrance of this group into automobile manufacturing and that the Jeffery purchase is only the first step in the formation of another big automobile combine.

The Jeffery company is one of the largest motor car plants in the Middle West. It was founded 17 years ago as a bicycle plant by the late Thomas B. Jeffery of Chicago. One of the products with which it has achieved considerable success during the past few years is the Jeffery Quad a four-wheel-drive truck which has been used extensively for military purposes both in this country and abroad.

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23,879 Carloads June Shipments

New York City, July 18—Shipments of automobiles in June totaled 23,879 carloads, according to figures given out by the National Automobile Chamber of Commerce, which met at the Detroit Board of Commerce last week to discuss the freight situation. This figure compares with 17,075 carloads in June, 1915. For the 6 months ending June 30 shipments totaled 151,163 carloads compared with 89,613 carloads for the same period in 1915. It was also estimated that the earnings of railroads from shipments of finished products alone from automobile and truck factories will exceed $35,000,000 for the current year.

The meeting was interested particularly in subjects considered by the official classification committee at its meeting here to-day. This committee fixes the rates used by railroads east of Chicago and on its docket for the New York meeting are the ratings for speedometers and connections, lamps used on automobiles, magnetos, automobile trunk racks, automobile doors, dashes, wheel rims, steering wheels and most important of all, automobiles, passenger and freight. The automobile men approved some of the proposed ratings but were opposed to the ratings suggested by the classification committee on lamps, steering wheels and single automobiles and trucks.

Lamps would be rated 50 per cent higher than electric lamps for other uses and single trucks considerably higher than at present. It is claimed by the automobile interests that there is no justification for these changes. They will also ask for a specific rating on automobiles and trucks when boxed in carloads, as such shipments are now charged the same as when not boxed.

Dealers' Upheaval in New York

Silver Takes Chalmers—Overland Opens Branch—New Mitchell Sales Co.

New York City, July 17—Broadway's automobile row has experienced the greatest changes in the last few days that it has had for years, the Overland, Chalmers and Mitchell agencies all figuring in the changes. C. T. Silver, who has handled the Overland and Willys-Knight for many years, has discontinued them and taken the Chalmers agency, the Chalmers branch having been discontinued. The Overland company is establishing a branch and has in the meantime opened temporary quarters in the Circle Building on Broadway with E. B. Jackson, formerly manager of the Packard company of New York, as manager. A new organization, the Mitchell Motors Co. of New York, has been formed to handle the retail Mitchell sales in the metropolitan territory and the Carl H. Page company, which previously handled the Mitchell, will in future confine its effort to the wholesale end of the Mitchell in part of this territory. Mr. Jackson has been succeeded as Packard manager by Emlen Hare, who for some time has been in charge of the special truck department of the Packard company here. Further, George Stowe, who has managed the Chalmers branch here, has taken charge of the sales in the newly formed Mitchell Motors Co. of New York.

The Willys-Overland company's direct factory branch for the direct sale of Overland and Willys-Knight cars follows the policy already put in force of establishing its own branches in the most important cities in this country.

The Overland company has had in progress the erection of one of the largest service buildings in this territory with a view to taking over its own business, locating a temporary showroom at

(*Continued on page* 118)

S. A. E. Meets in Washington

First Standards Meeting Under Government Auspices Held at Bureau of Standards

WASHINGTON, D. C., July 18—For the first time the Society of Automobile Engineers has taken an officially recognized place in the work of national standardization. This was on the occasion of the meeting of the newly-appointed aeronautic engine division of the S. A. E. standards committee which met here today at the Bureau of Standards, representatives of the Bureau, of the army and navy and of the aviation industry being present. The chief business was to discuss the program of the division which was created because the army and navy authorities consider it vitally important that many things in connection with aeroplanes should be standardized with the greatest rapidity possible. The meeting was in every way a success, and it is obvious that the most vital matters will be handled very quickly.

The meeting was opened by Dr. S. W. Stratton, director of the Bureau of Standards, who made a short speech of welcome. He spoke regarding the great importance of the work which the S. A. E. were about to begin and stated that the bureau with its splendid equipment for testing, would be able to undertake a good deal of research work which would be necessary. Henry Souther, chairman of the aeronautic engine division and consulting engineer to the U. S. signal corps, then took charge and an immediate start was made on the more pressing problems.

The S. A. E. was represented by Howard E. Coffin of the Naval Consulting Board, A. Ludlow Clayden, chairman of the standards committee, and Coker F. Clarkson, general manager. Among members of the division well known in the automobile world were F. S. Duesenberg, designer of the Duesenberg racing motor; A. F. Milbraith, Wisconsin Motor Co., and H. M. Crane, Simplex Automobile Co., each of whom has been building aircraft engines. Another S. A. E. member who has been prominent in the flying field, Glen Martin, took a prominent part in the discussions as did Elmer S. Sperry, a prominent member of all the aeronautic societies and of the Naval Consulting Board. Captain Clark of the army aviation department and Lieutenant Richardson of the navy also spoke repeatedly, throwing much light upon troubles encountered in the use of aeroplanes.

Owing to the continued full power running of aeroplane engine spark plug troubles are prominent and several ignition experts, notably the Bosch company, consider that the small metric plug is better suited for heavy duty than the ⅞-in. S. A. E. standard. The idea is that the thinner shell allows the heat to escape more readily from the insulator. That practical experience bears out the contention was soon obvious, but some doubt remains because most experimenters change the make of plug at the same time as the size. The general opinion, however, was distinctly in favor of the small plug and it is expected to settle the question at the next meeting to be held in about 30 days.

Next arose a long discussion on the possibility of creating a standard propeller hub, so that only one size could be used for all aeroplanes. Some members contended that this was impossible, but it is understood that a standard hub is being used in France, so one or two sizes should take care of all requirements in America. The meeting voted to send blueprints of the French standard to all interested parties for comment on its desirability as a standard.

What Is Right-Hand Motion?

A somewhat involved argument took place on the definition of a right-hand or left-hand engine. It is necessary to define the viewpoint and, even if this is done, there remains the difficulty that propellers are right and left-hand pitch and in some cases a left-hand pitch propeller might go on either a right or left-hand engine. The difficulty was solved by adopting a definition standardized by the electrical industry, which states that direction of revolution shall be described as clockwise or counter-clockwise, the observer standing looking at the driving pulley with the motor behind the pulley. In other words, an automobile engine would be a counter-clockwise engine because its rotation is counter-clockwise when looking at the end from which the power is taken.

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N. A. C. C. Mid-Summer Meeting at Christmas Cove

NEW YORK CITY, July 18—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has left this city for Christmas Cove, Me., to attend the mid-summer meeting of the Chamber at Clifton, Samuel Miles' summer home.

The meeting will be held on July 25 and the directors will leave on the next day. Following are those invited:

Hugh Chalmers, R. D. Chapin, Hudson; C. W. Churchill, Winton; Chas. Clifton, Pierce-Arrow; T. Walter Drake, Hupp; C. C. Hanch, Studebaker; Wilfred C. Leland, Cadillac; Alvan Macauley, Packard; W. E. Metzger, Argo Electric; R. E. Olds, Reo; Carl H. Pelton, Maxwell; H. H. Rice, Waverley; Windsor T. White, White; John N. Willys, Willys-Overland; Col. George Pope, A. L. Riker, Locomobile, and Alfred Reeves, general manager, together with some personal friends of Mr. Miles.

Eclipse Entitled to Bijur License

Disputed Contract of License Declared Valid—Appeal To Be Made

BUFFALO, N. Y., July 14—The Eclipse Machine Co., Inc., Elmira, N. Y., and Vincent Bendix, Chicago, have been awarded the decision in their suit with the Bijur Motor Lighting Co., Hoboken, N. J., Judge Hazel rendering the decision in the district court here to-day. The suit was brought by the Bijur company in 1914 for infringement of its patent on a starting motor gear, contending that the Bendix gear used in motor starting apparatus infringed patent No. 1,095,696 granted to Joseph Bijur in May, 1914.

Previous to the suit an alleged contract was entered into between Vincent Bendix and Joseph Bijur by which Bendix and the Eclipse Machine Co. were given the right to manufacture the Bendix drive device under the Bijur patent. The suit largely centered around this contract, which was declared by the Bijur company to consist only of tentative arrangements intended to be subsequently embodied in an agreement. Judge Hazel decided otherwise, holding that the contract fairly expressed the intention of the parties and was without ambiguity or indefinitiveness.

A second point of importance in connection with the contract was that it bore the signature of Joseph Bijur, president of the Bijur Motor Lighting Co., and that it had not been passed upon or authorized by the board of directors. The court held that the signature of the president was sufficient to make the contract valid, in that the president has both presumptive and actual authority to bind the company by the contract to which he agreed. The court declared the contract valid and that the Eclipse Machine Co., and Mr. Bendix were entitled to a license under the Bijur patent.

The Bijur Motor Lighting Co. intends to have Judge Hazel's decision reviewed on appeal which will be taken at once.

The case is of unusual interest because the type of drive for starting motors involved in the suit is now in almost universal use on American-built cars. The Eclipse Machine Co. commenced the manufacture of these devices in January of 1914, under a license from the inventor, Vincent Bendix of Chicago, and in May, 1914, a patent for a similar device was issued to Joseph Bijur. By the disputed agreement Bendix and his licensee the Eclipse Machine Co. were given rights to manufacture the device under the Bijur patent as well as under the Bendix invention. Soon after this the Bijur company brought suit.

5000 Tractors for Texas

Farmers Ready to Purchase at 1916 Tractor Demonstration in Dallas

By S. P. McMinn
Staff Correspondent

DALLAS, TEX., July 18—*Special Telegram*—More than 12,000 people witnessed the opening of the national circuit of farm tractor demonstrations here to-day. The city is thronged with farmers and their families, many of whom came in their automobiles, and all interested in tractors, either contemplating an immediate purchase or investigation with a view of buying machines for use on their farms. Around the field on which the demonstrations were held 350 automobiles were parked and many more were continually driving up. It is expected that fully 200,000 persons will witness the demonstrations here before they are concluded.

The farmers of Texas will purchase 5000 farm tractors in 1916. Last year Texas farmers bought upward of 1700 tractors, and in the past three seasons tractor manufacturers and dealers have disposed of more than 3300 machines in Texas.

With the formal opening of the first of the 1916 national tractor demonstrations here to-day this city is crowded with farmers who are ready to purchase machines and with motor car dealers and garagemen who are ready and willing to complete arrangements to do business with the farmers. One big distributer of automobiles already has signed up to distribute tractors. This is the Frawley Motor Co., distributer of Reo and Briscoe cars. The Frawley company has contracted to distribute throughout the entire State of Texas, and possibly also Oklahoma, the Denning tractor produced by the Denning Tractor Co., Cedar Rapids, Iowa.

It is reported on good authority that at least four other big automobile distributers, and possibly five, will make similar connections with other tractor concerns this week. The Dallas demonstration is held on the Caruth farm, of 1000 acres, near the city. There are now ninety-five tractors on the ground.

Hutchinson, Kan., Next

The demonstration will be formally opened to-day, and every day until Friday there will be public demonstrations of power plowing, disking, harrowing, cultivating and the use of tractors for other farm work, such as ensilage cutting, wood cutting, pumping, etc. Saturday the entire demonstration will be moved in special trains to Hutchinson, Kan., and from there to the other centers included in the circuit.

PAUL SMITH

Paul Smith, Chalmers Sales Manager, Dies from Fall

NEW YORK CITY, July 15—Paul Smith, vice-president and general sales manager of the Chalmers Motor Co., Detroit, Mich., died to-day after falling from the window of his room on the tenth floor of the Hotel Biltmore.

Mr. Smith had just completed a $6,000,000 deal with C. T. Silver for the transfer of the local agency of the Chalmers company. He was suffering from an attack of ptomaine poisoning which is said to have had nervous complications.

The position of vice-president of the Chalmers company had been held by Mr. Smith for the last 2 years.

He was 33 years old and born in Maine. He was educated at the University of Illinois to be a physician. Ten years ago he was a physician in Columbus, Ohio, but for only a short time. From there he went to Detroit, working as a day laborer in an automobile plant. Shortly after this he became Columbus agent for the Goodyear Tire & Rubber Co. While he was sales manager for the Goodyear company in New York City, Mr. Flanders became interested in him and made him sales manager for the E.M.F. Co. This was in 1909. In 1911, he assumed the same position in the E.M.F.-Studebaker Co. In 1912 he organized the Flanders Motor Car Co., and the following year joined the Lozier forces. It was in 1915 that he became associated with the Chalmers organization.

Mr. Smith was a member of the Detroit Athletic Club, Fellowship, Harmonic, Racquet, Anchor, Curling and other clubs of his home city. He also had served as a first lieutenant in the First cavalry of the Illinois National Guard. Besides the widow, he is survived by a daughter.

Plan Greater Sales Efficiency

Nation's Leading Business Men Form World's Salesmanship Congress

DETROIT, MICH., July 13—Greater efficiency in industry through greater efficiency in salesmanship is an object of the World's Salesmanship Congress which concluded a 5-day session in this city to-day. The organization was rounded into a permanent form with an attendance of nearly 3000 and plans to proceed actively with its work for better conditions in business and merchandising.

Able addresses were delivered by a large number of executives from all parts of the country and from many lines of industry, although the motor car men predominated in leadership because the science of selling has been well developed by them and because the idea of the Congress originated in Detroit, the automobile capital. One of the first steps discussed was an effort to have established selling courses in existing schools and colleges. Better and more complete text books on selling are desired and an effort is to be made to classify all selling knowledge brought out by the addresses and discussions at the Congress.

For a continuance of the work and the permanence of the organization, Norval A. Hawkins, general sales manager of the Ford Motor Co., was made president. The vice-president is Bartley J. Doyle, president of the Keystone Publishing Co., Philadelphia.

The Executive Board represents various line of business and is made up of:

President, Norval A. Hawkins, general salesmanager, Ford Motor Co., Detroit.

Vice-president, Bartley J. Doyle, president, Keystone Publishing Co., Philadelphia.

Secretary-manager, to be selected by board.

John Wanamaker, New York and Philadelphia.

John H. Patterson, president, National Cash Register Co., Dayton, Ohio.

Edward A. Woods, president, National Association of Life Underwriters, Pittsburgh.

Hugh Chalmers, president, Chalmers Motor Co., Detroit.

B. P. Neff, secretary, F. A. Patrick Co., Duluth.

Harry W. Ford, president, Saxon Motor Co., Detroit.

Harry M. Jewett, president, Paige-Detroit Motor Car Co., Detroit.

Joseph Mack, president, Joseph Mack Printing House, Detroit.

Nearly 3000 salesmen and business executives registered at the Congress, and it is planned to raise $100,000 for the promotion of the work.

The Congress opened Sunday, July 9, with addresses in 18 Detroit churches

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(*News continued on pages* 117-124)

754,902
Passenger Cars Made in First 6 Months of 1916

Ninety-Nine Factories Contribute — 96 Per Cent Made in Michigan, Ohio and Indiana—Ford Alone Makes 298,000, Overland 94,477, Others Over 40,000

By J. Edward Schipper

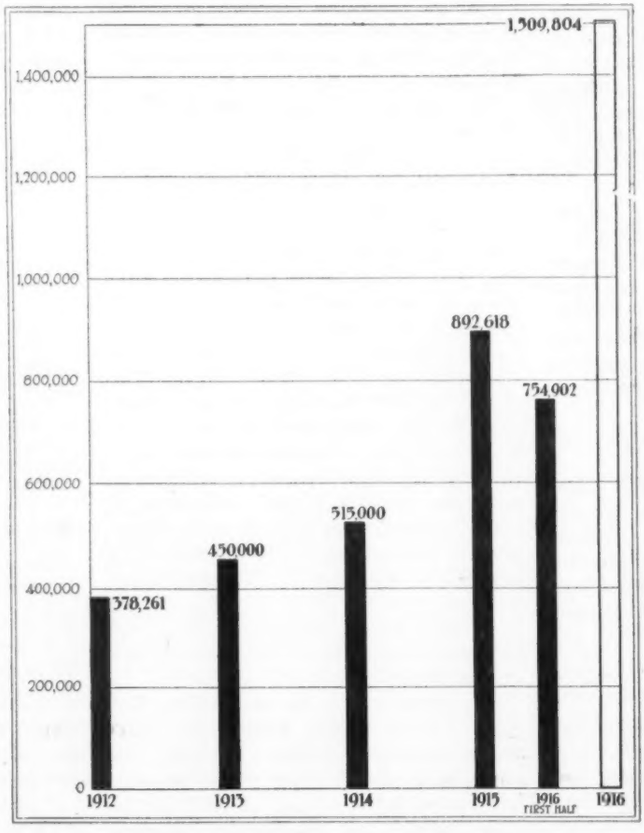
WHEN Jan. 1, 1917, marks the beginning of a new year, more than 1,500,000 passenger cars less than a year old may be traveling the roads of the United States, or will have been shipped to other lands. This prediction is not based on estimates but upon the fact that **during the first six months of 1916 or the period closing on June 30 at midnight, 754,902 passenger automobiles had been completed in American factories.**

In all factories throughout the country practically without a single exception, the rate of production is being increased at the present time. During the year, from July 1, 1915, to July 1, 1916, many production records were shattered by concerns which had installed new methods of manufacture and new machinery. During the year period mentioned 1,300,000 cars were completed, and this enormous production was made in spite of difficulties which were more severe than those encountered for many years. This is particularly true regarding the shortage of raw materials and the difficulty of securing adequate quantities of labor.

Ninety-nine automobile factories produced passenger cars during the first six months of 1916. Of this number 27 are located in Detroit and immediate vicinity. Twelve are in Ohio, twelve in Indiana, and the remainder scattered about the country almost from coast to coast. Of the 754,902 cars made during the first six months of 1916, 96 per cent were made in the three States of Michigan, Ohio and Indiana. Of this, of course, Michigan claims the lion's share with the great plants centering about Detroit. Seventy-nine per cent of all the cars made in this country from January to July were made in the Wolverine State, or 595,153 in actual figures.

Ohio ranks second as a car-producing State, having made 15 per cent of the total, or 111,946. Indiana made 2 per cent during the first 6 months, giving a total number of 15,110. The remaining 4 per cent of the factories were well scattered, with a fair share in Illinois, New York and Wisconsin, where the natural railroad facilities lend themselves to the quick delivery of materials and also render possible good shipping facilities for the finished product. Both of these factors are extremely necessary to the big producing concerns, particularly as regards shipping the cars, because each car takes up such a large percentage of space in a freight car, thus necessitating a great number of freight cars to take care of even the daily product of some of the large concerns which have schedules up as high as 1,000 a day and more.

Ford leads the list of big producing concerns, with a record of 298,000 cars in the first 6 months of 1916. During the one year period of July, 1915, to July, 1916, more than 477,000 Ford cars or the parts to as-



Production chart showing how first 6 months of 1916 compare with entire years of previous manufacture

semble them left the shipping department of the Highland Park factory. Second in order of production, as far as quantity is concerned, is the Willys-Overland plant at Toledo. This concern produced 94,477 cars during the first 6 months of 1916 and more than 150,000 during the year ending July 1, 1916. Third in production order is Maxwell, with more than 40,000 for the 6 months' period and approximately double that number for the 12 months ending July 1, 1916.

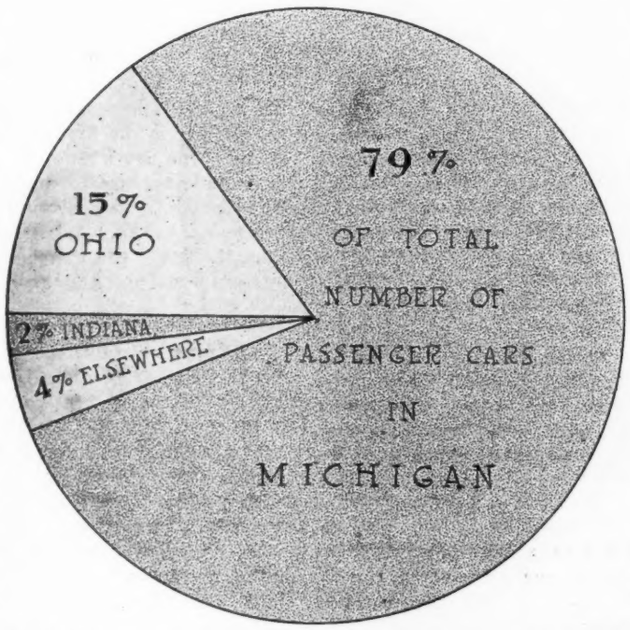
Other big producers are Chevrolet, Buick, Dodge and Studebaker, with more than 40,000 for the first mentioned and between 30,000 and 40,000 for the others for the 6 months' period. There are a great many concerns ranking between 10,000 and 20,000 for the 6 months, and among them may be mentioned Chalmers, Hudson and Saxon. With practically all these companies production activities have been such that during the first 6 months of 1916 many more cars were made than during the last half of 1915, so that the total production figure for the year ending July 1, 1916, is less than double that of the 6 months then ending.

Difficulties During Period

During the last half year, the difficulties that have beset car makers, as far as materials and labor are concerned, have by no means disappeared. At the same time, manufacturing schedules and material orders and deliveries have been adjusted to the circumstances, with the result that on the whole it can be truthfully said that production is progressing more uniformly than during the greater part of 1915. Deliveries of materials are more regular and in a great many instances manufacturers are now stocked with large quantities of the very parts that delayed them during the early stages of the present situation.

Where the improvement can best be noted is in the plants which assemble their cars from parts bought from individual manufacturers. These concerns had the greatest difficulties because a missing part would tie up the entire product and absolutely check deliveries. For instance, one concern in Indiana was unable to secure any motors except in groups of two and three for a period of three months, with the result that large numbers of completely assembled chassis minus the motors were lying useless in the plant, taking up valuable space and representing loss on the invested capital. Another concern was in practically the same position in regard to rear axles, while it had plenty of motors. Another concern found it practically impossible to secure radiators. Another had trouble with bodies, and thus it has gone throughout the entire gamut of parts. A factory would be overstocked with a certain part and would lack another, while practically next door a concern manufacturing a similar grade of cars would have plenty of the parts needed by the other concern and be short on the parts of which the first concern had plenty. It is this situation which has been considerably adjusted and which has ceased so seriously to interfere with shipments.

Although the material situation has been felt by the concerns which manufacture practically all their own parts, these are in a way more elastic. Taking motors, for example, a manufacturing concern would never be troubled to secure an entire motor, although it might be hard to secure adequate quantities of certain parts for the motor. On the other hand, assembling concerns, in many instances, were held up because they could not secure any motors at all. The completion of war material contracts by many of the steel consuming plants has no doubt tended to further relieve the market.



Ninety-six per cent of American cars were made in the three States of Michigan, Ohio and Indiana

Statistics of Industry

Some of the statistical figures of the automobile industry are entrancing. They form a romance of big business and prodigious capital that has never been equaled in the history of the world. When it is noted that one concern alone turns out, in a half year, over $119,000,000 worth of cars, it seems almost beyond comprehension that there should be any room for other manufacturers, and yet there are ninety-eight others not turning out as many but practically all prosperous and all with definite manufacturing schedules. During the year of 1915, from January 1 to December 30, 892,618 cars were produced. This seems like a tremendous number and yet, during the first half of 1916, 85 per cent of that total have already been made. In 1914, 500,000 cars were manufactured; during the first half of 1916 that many and more than half again as much have been shipped.

Studying the production curve, almost the opposite conditions from what one would imagine would be true actually obtain. Starting with 1903, when cars first came into general demand, it would be thought that the demand created would cause an overwhelming production until the immense market was overtaken to some degree. Yet, it was not until 1909 that production actually reached 100,000 cars per year. In 1910, it had increased to 200,000, and in 1911 an actual fall-off in rate of increase is noted. Three hundred thousand cars per year was reached in 1912, and 500,000 in 1914. Here the curve takes

Overland factory. Less than one day's output, showing how much stock is required to keep up with a production capacity of 1000 cars a day

a sharp upward bend and the rate of production far exceeds anything that has gone before. Predictions of 1,500,000 cars for 1916 do not seem far amiss, even though this is an increase of more than 55 per cent over 1915, or in actual numbers, 500,000 more cars made this year than last.

The total retail value of the passenger cars built in the United States in 1915 was $565,856,450. Thus far in 1916, or for the period of the first half year, the retail value of the passenger cars is in excess of $481,100,000. These cars have already been actually sold, and in many cases manufacturers have more than sold their output for the first six months and are having difficulties in keeping up with the delivery schedules to their different dealers. This is caused, of course, both by the material shortage and by the fact that the dealers have sold more cars than their original schedule called for. It is quite true that the second reason has had practically as much influence as the first, although it is also true that more than one concern has lost as much as 45 actual days from their manufacturing schedule during this same period of time, due to movements of plant location and other disturbing factors. In fact, during this year there has been an unusual amount of factory and plant movements, as well as expansion.

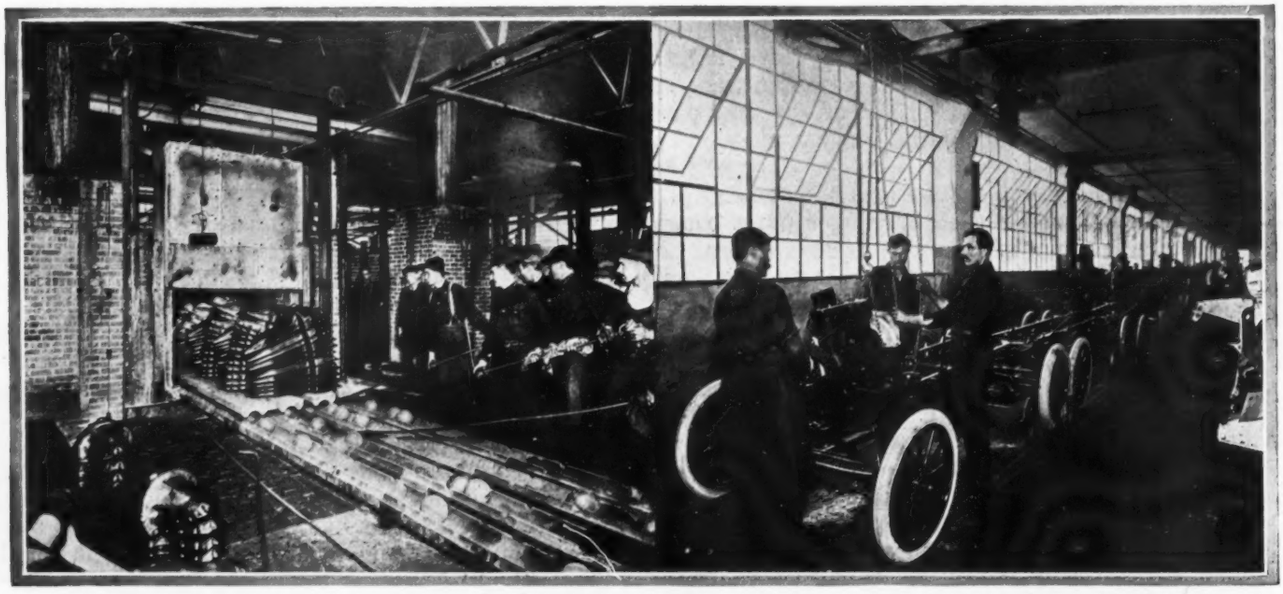
Many Add Floor Space

The addition of new floor space to a factory necessitates expanding into the new room and very often entails a re-routing of the product. There is no doubt but that at least 60 per cent of the larger manufacturing concerns have had to perform the difficult feat during the past six months of continuing their production schedule while rearranging the plant. Many new buildings have been added and many are now under process of erection. To give a few examples, the Ford company is practically doubling its factory area and predictions are made of a manufacturing schedule of 1,000,000 cars a year. In Indiana, the National company, for example, is putting up a new building and will shift into it without stopping manufacturing. Marmon, likewise, has bought new acreage. The Overland company is continually making additions to its plant and even now is just about completing a large new office building. Other plants which are adding space are Inter State, Jeffery, Haynes, Chandler, Hupmobile, Saxon, Scripps-Booth and a score of others. In practically every instance where these increases have been completed and occupied as part of the regular production plant, the change has been made without shutting down, with only a slight delay.

One of the most important problems in connection with the work of a big production concern is that of distribution. It is necessary to know the territory and the people in which the cars are to be sold, and therefore data which would tend to bring out information regarding which states are increasing fastest in number of cars, or, in other words, which are buying most, is of greatest interest. It has been said that the farmer is the greatest car purchaser of to-day, and this seems borne out when it is noted that Ohio bought more cars than any other state during the last half of 1915 and the first half of 1916. Actual figures cannot be given for increase up to July 1, 1916, but for the six months ending Jan. 1, 1916, the number of cars in Ohio increased by 58,802, or 48 per cent over its previous number.

Farmer the Greatest Car Buyer

The farmer is all-important as a car buyer. In Oklahoma, the increase of cars for the year of 1916, as compared with 1915 insofar as figures can be compiled at the present time, is 250 per cent. In Mississippi it is 195 per cent. In Louisiana, 210 per cent, and in Idaho, 117 per cent. In the great farming State of Iowa, there is one car to every fourteen persons; in Nebraska, one to every twenty persons, and throughout the other big farming states on the corn and wheat belts similar conditions prevail. The county fair of to-day is incomplete without its attending automobile exhibits. And unlike many of the pretentious automobile shows held, the farmers actually come to buy as well as to look.



Ford Methods—Ball carriers permit the trays to be rolled out of the furnace. Motors are lowered on to the completed chassis

In summing up this farm situation, a vice-president of one of the largest producing concerns approaches the situation from an interesting angle. He says, "The average value of the 7,000,000 farms in this country is $6,500. The owners of 1,000,000 of these farms have automobiles. At least 3,000,000, or one-half of the remaining farm owners who do not drive cars, are good prospects." In other words, according to this estimate, the entire output of 1916, or 1,500,000 cars estimated, could readily be absorbed by the farmer prospects alone. Estimating on this same basis of income, the same authority finds that there are 2,500,000 city people who are prospects for new cars.

Both of these estimates are for people who have never owned a motor car. They are first-time purchasers, and this does not take into consideration the ever-increasing percentage of those who are buying their second, third or fourth car, or those who own more than one.

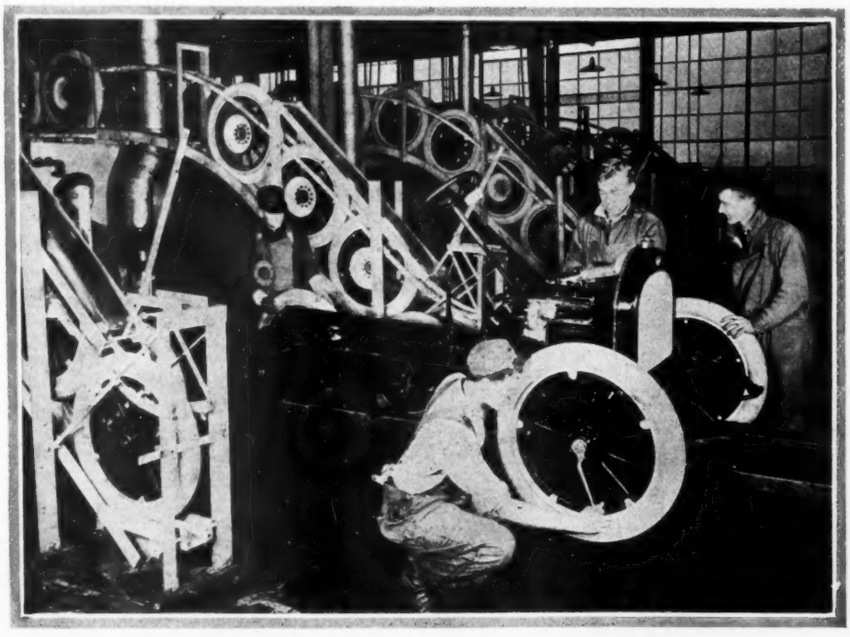
The fear that present big production schedules will saturate the market seems ungrounded when actual conditions are closely scanned. Throughout the industry, the close of the first six months of manufacture finds an optimistic current of thought in the minds of those whose business has been adapted to the modern methods of intensive manufacture, coupled with economical management. Both in the two well-defined fields of assembled and manufactured cars, the economies which have resulted from the use of up-to-date methods have enabled the product to be marketed at a profit in spite of conditions which otherwise would have been disastrous. The producers of assembled cars have reaped the benefits of the production methods in use in the parts plants, which have enabled these parts manufacturers to produce cheaply enough to allow the assembler who proceeds along modern lines the necessary margin of profit.

During the 6 months ending July 1, 1916 the number of passenger cars exported to foreign countries has been in excess of 33,000 and valued at more than $24,000,000. Detailed figures are not as yet available for the month of June, but from January until the end of May the average monthly exportation was 5645 cars and the average value of the car shipped abroad was $4,059,878 per month. The exact totals of the passenger cars shipped from the country during the 5 months ending June 1, 1916, was 28,227 cars valued at $20,299,393.

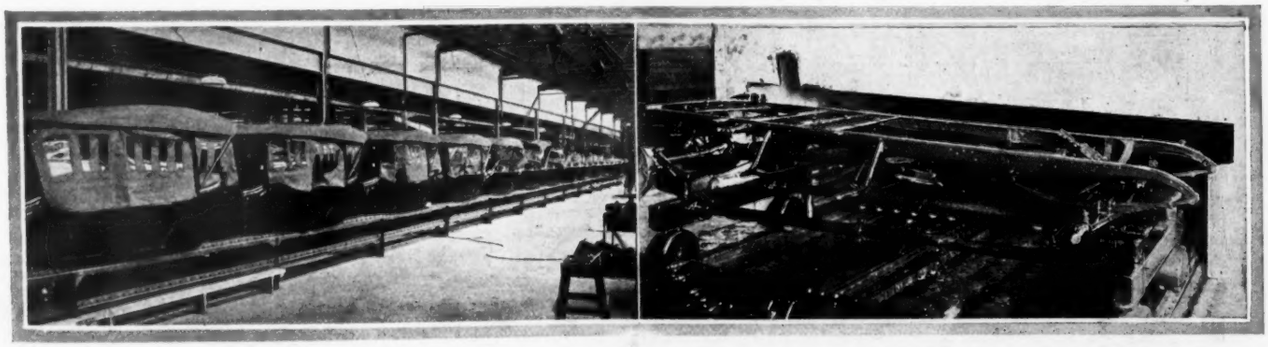
During the first half of 1916 the number of passenger cars made per month in the United States averaged 125,817. With the average monthly exportation of 5645 just about 4½ per cent of our total passenger car production is shipped abroad. Uncle Sam probably will always continue to be his own best customer, but the markets of the world are open to him and the probabilities are that the close of the European conflict will open large markets which are now inaccessible. It is of course natural to assume that the home industries of Europe will be protected, but if conditions are as they might be expected to be the market for automobiles will be larger than the recreated European factories can handle.

To sum up the situation, the 754,902 cars which have been made have practically all been sold, and in many sections of the country dealers are already clamoring for their share of the other 700,000 which are to be manufactured during the remaining 6 months, and when the year of 1916 shall come to a close, if present conditions hold until the end, the United States will have been enriched by the possession of considerably more than $1,000,000,000 worth of cars.

The prosperous condition of the automobile industry has been reflected in other lines. The companies selling manufacturing machinery have been rushed as never before. High-speed steel necessary for fast cutting and big production is at a premium and all along the converging pathways of manufacture the story has been the same, "Give us men, give us materials and give us machinery—we can use them all."



Overland factory. Wheels fed by magazines to the required points



Left—View in Maxwell factory. Each body is a step nearer completion. They are moving gradually to the point where they will be picked up by an electric hoist and set on their chassis, as the latter reach that point in their growth into complete automobiles. Right—Painted chassis just entering the drying oven. In 30 min. the moving chain will pull it out dry at the other end, and the work of assembly will continue again. Another follows it only a few feet away

Buick Returns to Four

Entirely New Small Car Added to Line —The Little Six Continued Unchanged

Front view of the new Buick four-cylinder touring car

AFTER giving up entirely for a time the manufacture of four-cylinder cars, the Buick Motor Co., Flint, Mich., is again to put them out, in addition to continuing without change the production of the little six-cylinder model that made such a hit during the past season. Reversions to fours by so large a manufacturer might be taken as a significant move, and indicates that there is a big demand for a moderate-priced vehicle of this type.

The new Buick four, which, needless to say, is to be made in large numbers, follows characteristic Buick design throughout, with perhaps more alteration in the engine than elsewhere, although that unit is a valve-in-head type as are other power plants of this make. It will sell at $665 as a touring car under the model designation of D-35, and as a roadster it will be priced at $650 and known as model D-34. In its general lines, especially the radiator, the new car is typically Buick. It has a wheelbase of 106 in., and there is plenty of room for five passengers.

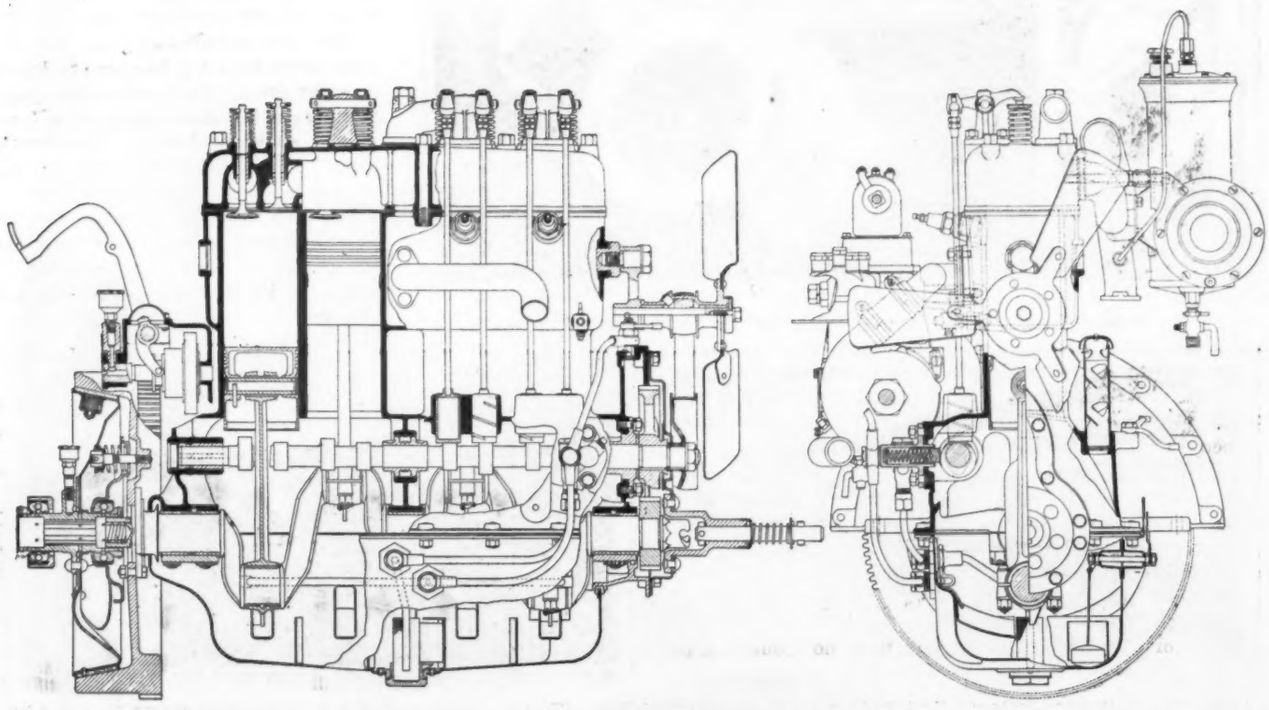
Thirty-five brake horsepower is claimed for the engine, which has a bore of 3⅜ in. and a stroke of 4¾ in., giving a displacement of 170 cu. in. and a formula rating of 18.2 hp. These cylinder dimensions are not a great deal different than those of the little six, which has a bore of 3¼ in. and stroke of 4½ in.

Other specifications of interest are the pump cooling; Marvel carbureter in conjunction with rear tank and Stewart vacuum feed; Delco combination starting, lighting and ignition; cone clutch; three-speed gearset in unit with the engine; driveshaft inclosed within a torsion tube; three-quarter floating rear axle; semi-elliptic springs both front and rear; and 31 by 4 non-skid tires all around.

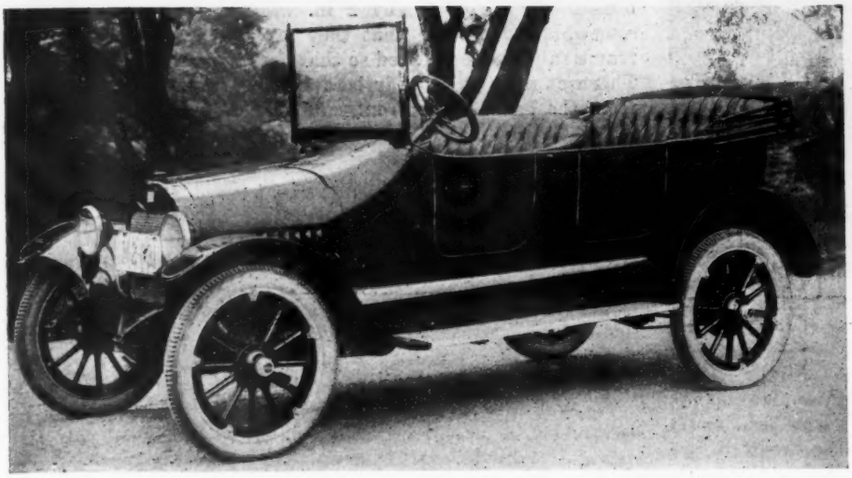
Has Detachable Head

Although the engine is an overhead valve design, it is probably the one part that is most at variance with previous construction, in that the cylinder head is detachable as a unit with the valves. It will be remembered that previous Buick construction has been to have the heads integral with the body of the cylinders, and to use valve cages, which, when removed, brought out each valve individually. The new design makes it possible to get at the valves when the head is taken off, and at the same time gives a free opening into the cylinders and pistons. The valve springs and rockers are not inclosed, but are quiet due to the lubrication provisions and the interposing of a felt pad at the ball end of the push rod, as in previous designs. The rocker shaft supports are bolted to the head casting, and this also carries the water outlet connection.

In the design of the head, special provision was made for the proper cooling of the valves, the water passages surrounding the pockets being large. On the whole, there is



The new 3⅜ by 4¾-in. Buick four-cylinder engine in section. It has a displacement of 170 cu. in. and is claimed to develop 35 brake hp. Note the characteristic overhead valves and the pump cooling



Buick five-passenger, four-cylinder touring car which sells for $665. It has a 106-in. wheelbase and uses 31 by 4-in. tires

nothing radically different in the design of the motor as compared with the conventional overhead-valve, removable-head job, yet the details have been worked out to give a surprisingly compact whole.

In its general arrangement, the motor has its push rods on the right, and both intake and exhaust manifolds occupy the left side. On the push-rod side is mounted the Delco single-unit starting and lighting outfit with ignition distributer integral. This motor-generator is driven off the pump shaft, which in turn is operated by a helical gear meshing with the camshaft gear. Mounted directly on the motor on the manifold side is the vacuum tank, and below it the carbureter, giving a very short feed pipe between tank and carbureter, with obvious advantage. The upper half of the flywheel is housed over by an extension of the upper portion of the crankcase, which is integral with the cylinder block. This extension meets an extension of the gearbox, and the two bolt together by means of a flange, giving a substantial support to the gearset and kindred parts without excessive weight.

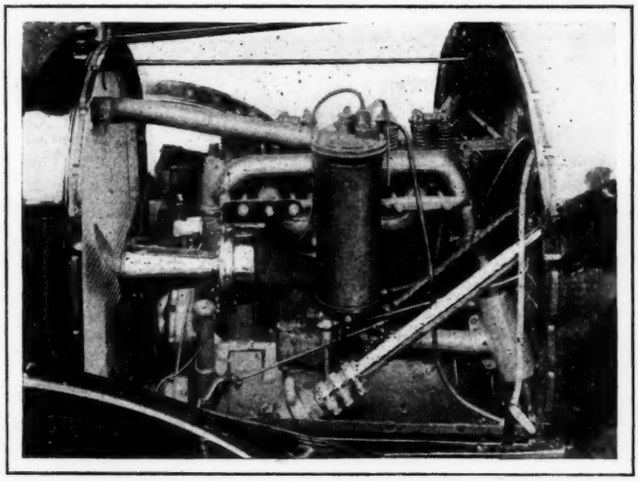
Large Valves a Feature

There are three main crankshaft bearings and an equal number carrying the crankshaft, both of which parts are of sturdy section so as to reduce the vibration and make a smooth-running engine. Valves are quite large—1½ in. diameter—and the gas passages are as direct as possible, both features being power-giving factors. Conventional connecting-rods of I-beam section, and pistons carrying three rings each are fitted, the wristpins being pinned to the pistons so that the upper rod end has a bearing on the wristpin.

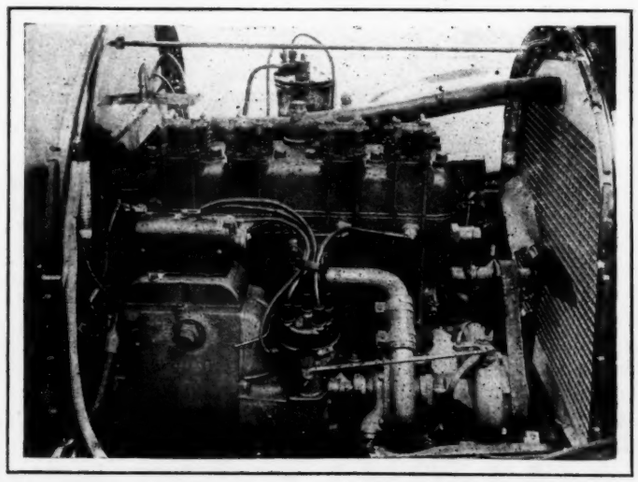
Much attention seems to have been given to working out the cooling system, as evidenced by the wide water spaces, and the carrying of the cylinder jackets well down to within about 1 in. of the bottom of the piston stroke. The water spaces in the head are extra large, and it would seem that warped valves due to heat are an impossibility. There is a three-blade pressed steel fan, belt-driven from a pulley on the end of the camshaft, with provision for adjustment of the belt tension through the rocking fan bracket that attaches to the front of the cylinder casting proper. The centrifugal pump delivers the water to the center of the cylinder block on the right side, and the passages insure even distribution all around. The cellular-type radiator is of generous proportions for this engine, and should have no trouble in caring for its needs.

Likewise, care has been expended on the design of the lubrication arrangements. Oil is drawn from the pressed-steel under part of the motor by a cam-operated plunger pump, delivered through a supply pipe to each of the troughs under the connecting-rods and also through a special lead to the timing gears at the front. It is then splashed in the usual way to the various bearing surfaces by the dipper on the end of the rod. The troughs are curved so as to follow the rod end for a considerable distance beyond its dead-center position on either side, taking care of any difference in level between one side of the car and the other. On top of each a connecting-rod upper end there is a hole drilled to catch some of the splashed lubricant and lead it to the bearing, and the tappets are spirally grooved so that they carry oil onto the entire surface of the chambers in which they work, making for quiet operation. On the left of the crankcase there is a breather, which is internally baffled so that any spray from the crankcase will not get out to collect on the outside of the engine, and there is also a float gage connecting with an indicator hand that plays over a dial mounted on the left side of the crankcase to inform the driver how much oil he has left.

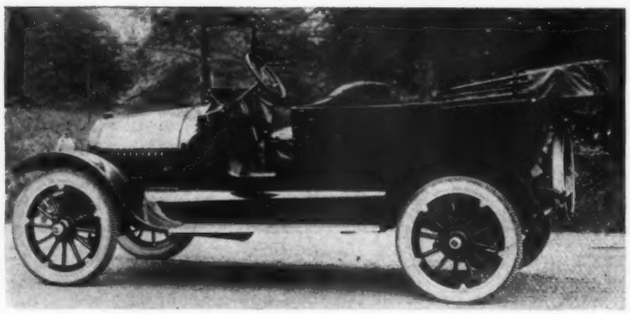
In common with practically all installations now, the start-



Left side of the engine of the Buick four, showing the arrangement of intake and exhaust manifolds



Right side of Buick four engine, showing mounting of starting and lighting units and ignition distributer



The new Buick four has a wide door with plenty of room in the driver's compartment. The instrument board is neat and simple

ing motor meshes with teeth in the flywheel rim, pressing the pedal meshing the armature shaft gears with these teeth. The ignition distributer sets vertically on the front of the electrical unit, and is driven by spiral gear connection with the motor-generator shaft. Mounted on top of the motor-generator case is the ignition coil, and as the spark plugs enter the cylinders on the same side of the engine, there is a minimum of wiring from distributer to plugs, etc. These and other wires are inclosed within metal flexible conduit, a precaution against trouble that cannot be too highly recommended.

There is a leather-faced cone clutch on this car which is similar in design to that employed in other models. The cone itself is a pressing, and there are three springs placed at equal distances apart to hold the unit in engagement. There are also small springs inserted at intervals under the leather to force it out and produce a soft action. The clutch assembly includes two ball thrust bearings, the forward one taking the thrust from the engagement springs and the rear providing for the thrust occasioned by disengagement of the cone. The shaft on which the cone slides has six splines, and each of the engagement springs is provided with an adjusting nut which makes it a simple matter to give the proper tension, especially since the clutch can be reached from below the bell housing without the removal of any parts.

Chrome-nickel steel gears are used in the gearset, these having teeth of stub form so as to resist any suddenly imposed shocks. The bearing equipment for this assembly consists of a roller bearing for the clutch gear, a double-row ball bearing for the square shaft, and plain bearings with bronze bushings for the countershaft.

Ball Joint Torque Tube

The drive is taken through a single universal joint just back of the gearset, this being of large proportions and fully inclosed. The propeller shaft is also completely housed within a torsion tube that attaches to a large ball-and-socket joint on the rear of the gearcase, and terminates at its rear end in a flanged member that bolts to the front of the differential housing. Thus the torque is taken through the shaft housing and the ball joint at the front end, while the drive is through the rear springs.

Of three-quarter floating type, the axle is a compact unit designed so that all the car weight is carried on the axle tubes, with no supporting strain on the driveshafts. These are mounted on spiral roller bearings at both wheel and differential ends, with a ball thrust bearing also fitted at either side of the differential. The gears are of the bevel type, and the ring gear has fifty-three teeth to thirteen on the pinion, giving a ratio slightly over 4 to 1, thus allowing the motor plenty of chance to drive the vehicle with all the flexibility that should be desired.

In the rear spring arrangement, Buick deviates from that of the little six, which has cantilever suspension. On the new four the springs are semi-elliptic, long and flat. The dimensions are 48 in. by 2 in. wide, and the mounting is somewhat unusual in that they are not directly below the frame rails, but bracketed so that they run outside the frame. This was done principally because the frame tapers straight from the back to the front, and if the springs were placed under the rails they would also be at an angle, and this might have introduced an undesirable bending moment. As the frame is narrower at the front mounting than at the rear, the brackets at the front are simply brought out farther to allow the springs to parallel the wheels. At the rear the frame members bend down sufficiently so that the springs are mounted almost flat and this, in connection with their length, makes for easy riding, since the spring action tends to both sides of the horizontal, with dampening effect upon shocks. The front pair are also quite long, measuring 30 in. and being of the same width as the rear.

Tapering the frame from back to front is also new to Buick design, but is becoming very popular with modern car designs. It allows a short turning radius, and at the same time gives excellent support for the tapering body along its entire length. To assist the side members there are four strong cross pieces, each anchored with the aid of gusset plates.

The popular sloping lines and smooth exterior, with hood blending into the cowl, are given the car, with sufficient rake to the steering wheel to give a good appearance. Attention has also been paid to the matter of leg room in the drive seat, and almost any type of person ought to find comfort in driving the car. Equipment includes all the fittings looked for by the car purchaser of to-day, among which might be mentioned the adjustable windshield, the one-man top, the electric horn, the speedometer, the extra demountable rim and tire carrier at the rear of the frame.

Little Six Unchanged

Brought out over a year ago, the little six that is to be the new four's running mate for the coming year, really requires no lengthy description here. It is known as model D-44 as a roadster, and with that body sells for $985. The touring car on the same chassis is called model D-45, and the price is $1,020. Briefly, the specifications, which are practically the same as they have been since the car was introduced, are 3¼ by 4½ in. engine, developing 45 hp.; Delco ignition, starting and lighting; circulating splash lubrication; pump cooling; cone clutch and three-speed gearset; 34 by 4 tires and wheelbase of 115 in.

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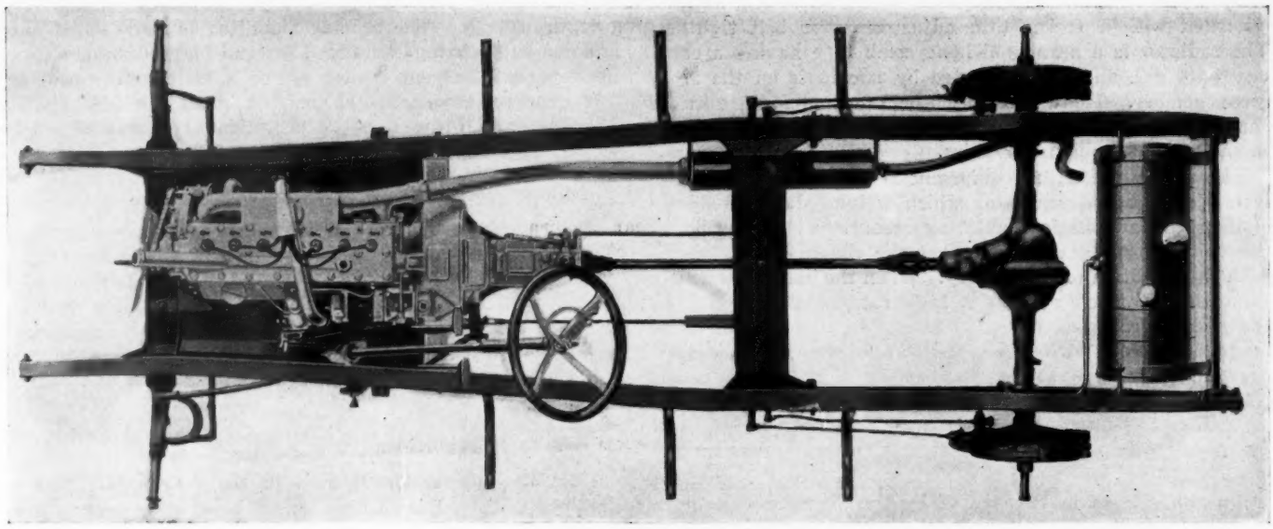
Dallas—$25,000,000 Distributing Center

DALLAS, TEX., did $25,000,000 worth of automobile business in 1915. In the city 178 buildings are exclusively occupied by the automobile industry. There are 108 wholesale and retail motor vehicle and accessory concerns located there. There are also seventy top, body and repair concerns doing business. More than 2600 employees are directly dependent upon this industry. It is estimated that these employees draw annually in salaries the amount of $28,000,000.

Such a business could not be produced if Dallas and the surrounding territory did not justify it. The State of Texas produces about one-fourth of the world's cotton crop and 60 per cent of this crop is financed at Dallas. That is the principal inducement that secured for Dallas the Federal Reserve Bank and which has caused the automobile concerns of the United States to center their Southern business at this city. Within a 100-mile circle around Dallas farm products annually are valued at $450,000,000, which is based upon figures recently obtained through census work.

There are 2500 financially rated business houses in Dallas, more than 400 factories and 275 wholesalers. One-fourth of the $400,000,000 worth of bank resources of Texas are held by Dallas banks. The average per capita wealth of the farmers within 100 miles is $7,500.



Chassis of the Marion-Handley 6-40, showing the compact unit power plant, strong frame cross-member and large gasoline tank at rear. Note the simplification of parts

Marion-Handley in Two Models

Small Six at $1,185 and Large Car at $1,385 Comprise the Line—Several Body Styles

TWO sixes will make up the line of the Mutual Motors Co., Jackson, Mich., for 1917. These cars are sold under the name of the Marion-Handley, taking the name from J. I. Handley, president of the company. The sixes are in two sizes, known as the 6-40 and the 6-60, and the two cars possess great similarity of design.

In picking out the features of the Marion-Handley line, probably the outstanding point is the lightness in ratio to power. The smaller car has about 1 hp. for each 60 lb. weight and the larger car weighs about 58 lb. per horsepower. Throughout, both cars will be seen to follow very closely the up-to-date practice of high-speed engine with light semi-flexible frame construction, giving the characteristics demanded in the way of quick acceleration and economical performance.

45 Hp. at 2000 R.P.M.

The 6-40, the smaller of the two cars, has a high-speed unit power plant, with the 3⅛ by 5-in. cylinders cast in a single block. The engine is L-head shape, has a displacement of 230.1 cu. in., and develops, according to dynamometer tests by the factory, 45 hp. at 2000 r.p.m. The upper half of the crankcase is cast integrally with the cylinders and the lower part is pressed steel, being merely used as a housing and an oil retainer. Its capacity in the latter respect is approximately 1½ gal. This part of the crankcase is detachable in the customary manner to permit of the adjustment of the connecting-rod and main bearings.

Three rings are used on the cast-iron pistons, which are 3⅛ in. in length. I-beam connecting-rods are used and both the upper and lower rod bearings are 2 in. diameter by 1⅞ in. long. The crankshaft is also 2 in. in diameter and is supported upon three main bearings, the front being 2¾ in. long, the center, 2¾ in., and the rear, 3⅛ in. These bearings are lubricated by a direct feed from the oil pump, thus maintaining a supply of lubricant to the crankshaft under pressure. The remaining bearings are taken care of by splash, and the timing gears are lubricated by overflow from the front main bearings. The crankshaft gear of the timing set runs continually in a well of oil. This permits the lubricant to be carried by the gear teeth over the surfaces of the entire timing set, thereby maintaining an oil film between the teeth of the gears at all times. The pump used in connection with this system is a plunger, operated by an eccentric on the camshaft and is self-priming because it is located in the oil reservoir in such a position that the last remnants of oil are sure to drain to the pump. A relief valve is provided to regulate the maximum pressure on the oil system.

Quiet-Running Gears

One of the points which has been given attention is the matter of quietness in the valve driving system, the cam gear being of Fabroil, which is a compressed cloth produced by the General Electric Co. and has the advantage of being non-resonant. This gear has a face width of 1 3/16 in., with 10 pitch helically-cut teeth. The camshaft is carried on die-cast nickel babbitt bearings. There are three bearings for the camshaft, two being of the material mentioned, while the third is an S. K. F. ball thrust, used at the rear end of the camshaft to take the thrust loads as well as the radial, in any direction.

A special alloy steel which the manufacturers claim to have many of the characteristics of cast iron is used for the valves. They are 1 3/16 in. diameter and have a lift of 5/16 in. One of the main points in which the alloy steel resembles cast iron in the valve is that it can be ground to a perfect seat. At the same time, owing to the composition of the metal, the molecular structure is much closer and the valves have a long life without as great chances of pitting.

Electricity All Westinghouse

Cooling is by a centrifugal water pump which is driven off the timing gears and is located on the valve side of the engine, in the same line as the electric generator. In connection with the cooling system there is a two-blade aeroplane type of fan of pressed steel which runs on ball bearings and

is fitted with a rocker arm adjustment for belt tightness. The radiator is a hexagonal honeycomb type having a capacity of 4 gal. and it is mounted by two bolts on the front cross member. There is also another unusual feature in the shape of a detachable case which is of considerable assistance in the matter of making repairs.

Electrically the entire equipment is Westinghouse. There is a Westinghouse generator which weighs about 16 lb. including the automatic regulating means. The latter is of the voltage type and is such that the charging rate varies with the condition of the battery. When the battery is nearly exhausted, it is charged at a high rate, while, when fully charged, the charging rate is reduced. In addition, the usual magnetic cut-out switch is incorporated so that when the charging rate falls too low, the battery is automatically cut off, thereby preventing a reversed current flow. The battery as well as the entire system operates at 6 volts and the capacity is 80 amp.-hr. An ammeter is located on the instrument board.

Ignition is also taken care of by the Westinghouse unit, the distributer being mounted on the generator, and the same unit contains the breaker box, spark coil and condenser. These units are easy to reach for inspection, the breaker box being inclosed within a collar which can be slipped out of the way when it is necessary to inspect or adjust the points, and the distributer cap is removable, together with the spark plug leads.

Control of the ignition and lighting system is by means of a set of switches on the instrument board. The lighting system consists of the Westinghouse generator, switches, and a full set of lamps in connection with the 6-volt, 80-amp. storage battery. A single pair of headlights is used with double bulbs. The larger bulbs are 20 candlepower for road driving, with 6 candlepower for dimming. The tail light is mounted in the center of the tire carrier, and all these lamps together with the remainder of the electric equipment is wired on the single wire grounded return system. In this the chassis, frame and metal body form one circuit. The starting motor is entirely inclosed and is engaged with the flywheel gear by means of the Bendix screw pinion shift.

Large Surface in Clutch

A dry multiple-disk clutch is employed, having eleven disks lined with Multibestos. Of these, five are driving and six are driven disks. They are 8 in. diameter and made of saw steel with an annular bearing for clutch release, this bearing being lubricated by the oil from the gearset which enters the clutch by means of grooves cut in the clutch shaft. An adjustment is provided on the clutch release pedal to take up any wear or lost motion that may develop in the clutch release bearing. This is done in order that the full throw of the clutch pedal is provided at all times, thus insuring the full disengagement of the clutch.

A Three-Speed Gearbox

A conventional three-speed gearbox of compact design is employed to transmit the drive from the clutch to the rear axle. The box is mounted integrally with the motor as a unit power plant and the entire construction is kept rigid by short shafts of nickel steel. The gears in the gearset have a face width of ¾ in., and the diameter of the countershaft is 1 5/16 in. with a 1½ in. main shaft. The splines are cut to a depth of ⅛ in. The bearing mounting is made up of four annular ball bearings arranged for end play adjustment, and the reverse idler gear is mounted on a plain bronze bearing. The gear reductions in the gearbox itself are 2½, 1 7/10, and 1 to 1, with reverse of 3.4 to 1. Final reduction is 4 5/12 to 1 at the rear axle.

Hotchkiss Drive Used

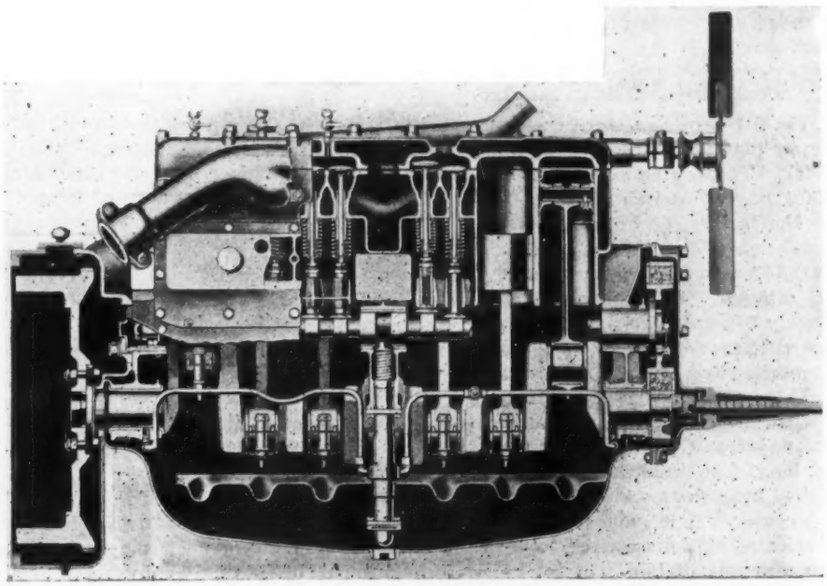
Both the drive and torque are taken by the rear springs, eliminating both torsion tubes and torque rods. A reduction of weight is further secured by the use of a tubular propeller shaft 1½ in. diameter with 5/32 in. walls. The shaft is equipped with two double ball and socket universal joints and has a fore and aft travel of 2 in. The universal cup, ball and trunnion pins are hardened and ground and packed in grease.

Robust Axle Proportions

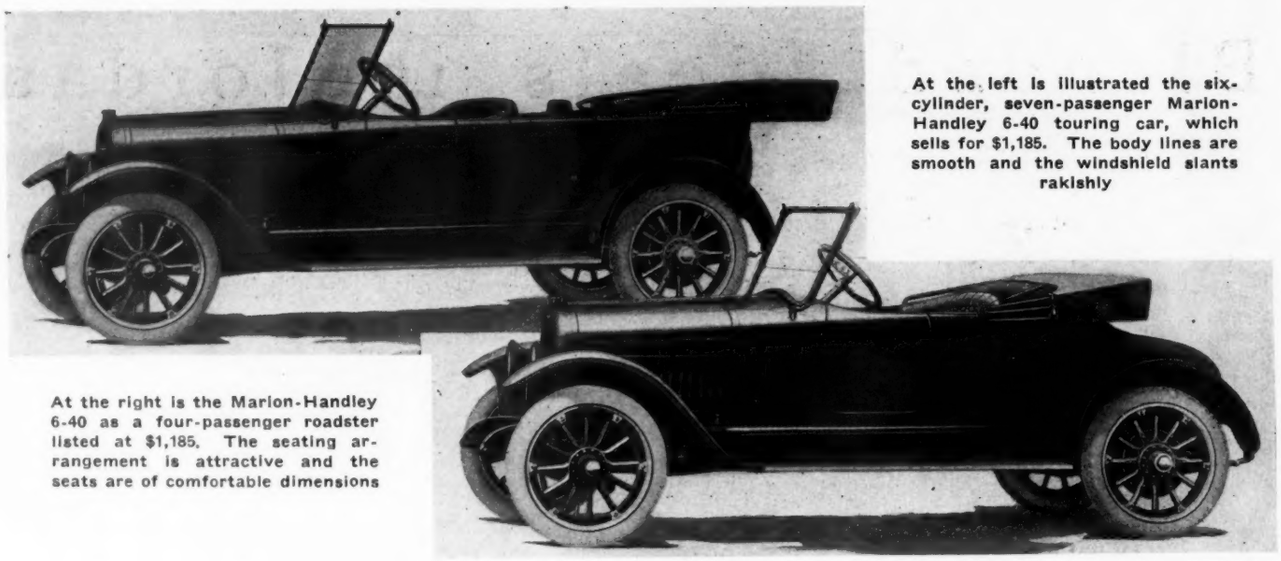
Floating construction is used in the rear axle. This is equipped with a Brown-Lipe spiral bevel gear and is provided with a set of Hyatt high-duty roller bearings with adjustable ball bearings for side thrust. The pinion shaft is carried on two annular ball bearings which are adjustable, allowing take-up for wear or play on the pinion shaft. The drive pinion can also be adjusted in regard to the mesh with the spiral bevel ring gear. Chrome-nickel steel is used for the drive shafts and they are 1¼ in. diameter. The entire differential may be removed by taking off the inspection plate over the differential.

Two sets of brakes are used with the drums on the rear wheels as usual. The service brakes are contracting and emergency expanding, both being provided with two adjustments, one on the brake rod ends and the other attached to the brake bands. The drums are 14 in. diameter and have a face width of 2 in.

Elliott type front axles are used of I-beam section, drop forged without welds, the spring seats being integral. The steering knuckle and axle ends are fitted with bushings while the knuckle pins are hardened and ground with a trap oiler at the top of the bolt to insure lubrication. The drive lengths are designed to permit a minimum turning radius and the car is able to turn about in a 25 ft. circle. Both front and rear wheels are of heavy hickory, with twelve 1½ in. spokes. The front wheels are carried on Gurney annular ball bear-



Section through the Marion-Handley block-cast six-cylinder engine. Note the large bearings. The cam gear is of Fabroil and special alloy steel is used for the valves



At the left is illustrated the six-cylinder, seven-passenger Marion-Handley 6-40 touring car, which sells for $1,185. The body lines are smooth and the windshield slants rakishly

At the right is the Marion-Handley 6-40 as a four-passenger roadster listed at $1,185. The seating arrangement is attractive and the seats are of comfortable dimensions

ings of the "100 per cent thrust" type. A full equipment of Firestone demountable rims is furnished, adapted to 32 by 4 in. straight side tires, and non-skids are used on the rear wheels. The wheelbase of this model is 120 in.

Equipment Is Complete

In equipment the car is complete, the 16-gal. round tank being located at the rear with Stewart-Warner vacuum feed. The body is a roomy seven-passenger design of heavy gage sheet steel, with pressed steel cowl and concealed hinges. There is also a four-passenger roadster of up-to-date construction, in which the driver's seat is set forward 15 in. from the double passenger seat and a fourth or auxiliary seat is carried folded into the dash. The standard equipment also includes a Chase leather one-man top with Collins quick detachable side curtains which swing open with the door. The windshield is slanting and is provided with clear vision features. The body finish is in dark wine color with black fenders and splash aprons.

6-60 Almost Identical Design

Of similar design is the 6-60. This is equipped with a 300 cu. in. motor, having its 3½ by 5¼ in. cylinders cast in a single block. This is also a conventional L-head design, and, according to the manufacturers, develops 50 hp. at approximately 1900 r.p.m. The crankcase is cast separately of aluminum and is equipped with a pressed steel oil pan. All the bearings are supported in the crankcase and are accessible by removing the pan. The inclosed valves are 1 11/16 in. diameter with 3/16 in. lift. They are operated by a single camshaft and both inlet and exhaust valves are interchangeable and have nickel steel heads electrically welded with carbon steel stems. The ends of all the valve stems are hardened to insure against wear from tappet action. Pistons and cylinders are both made from the same grade of reverberatory furnace iron, with a piston length of 3¾ in., fitted with three diagonally split concentric rings 3/16 in. wide. The piston pins are of annealed special steel tubing hardened and ground, with the pin held stationary in the piston bosses. The bearing surface is given by a bronze bushing pressed into the upper end of the connecting-rod.

An integrally-forged low carbon steel camshaft is used, carried on three bearings of white bronze. The dimensions of these cam bearings are: 2 17/64 by 1½, 2¼ by 1⅛, and 2 7/32 by 1¾, respectively, from front to rear. The crankshaft is also carried on two bearings and is of special crankshaft steel, heat treated to give a tensile strength of 90,000 lb. to the sq. in. The main bearing dimensions from front to rear are: 2 3/16 by 2 23/32, 2 7/32 by 2⅝, and the rear or flywheel bearing, is 2¾ by 3. All the bearings are reamed to a fit on expansion arbors and then finished with a slow-running spiral cut power burnisher which is stated to give a bearing surface of over 98 per cent.

Lubrication is by force feed and splash, actuated by a horizontal pump driven by an eccentric from the camshaft. This forces oil through copper tubes direct to the timing gears and the main crank and camshaft bearings. The remaining bearings are taken care of by splash.

Throughout the remainder of the chassis, the design of the 6-60 is quite similar to that of the 6-40, with the parts necessarily stronger and larger to take care of the higher power and greater weight. The Hotchkiss drive is used but the reductions are different, the final gear ratio being 4 1/3 to 1, and the wheelbase is also greater, being 125 in., while the tires are 33 by 4½.

The body equipment includes an up-to-date seven-passenger car and a four-passenger roadster. This car is fully equipped with accessories, having a Stewart-Warner vacuum feed, Chase top, Collins curtains, full set of instruments and tools, extra Firestone rim, etc. Prices are $1,185 for the 6-40 and $1,385 for the 6-60, in either roadster or touring form.

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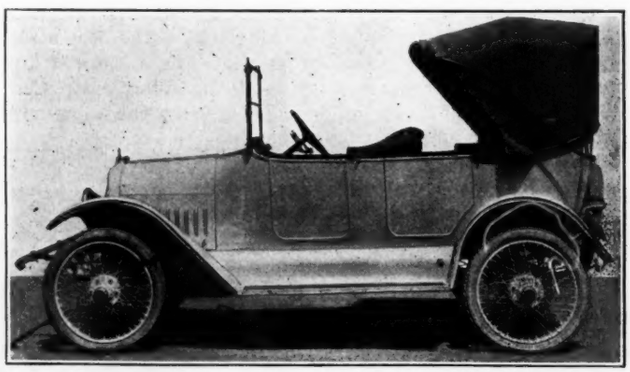
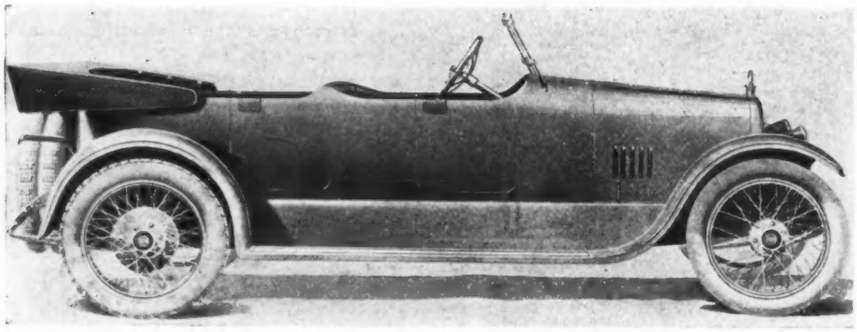
Special Maxwell with Victoria Top



Above is illustrated a recent creation by Harry J. DeBear, manager of the New York branch of the Maxwell Motor Sales Corp. It is a Maxwell touring car painted a special light blue and fitted with white wire wheels, Victoria top and slip covers to match. The car sells for $950 complete, f.o.b. New York City

Blended Ideals in Jordan



Jordan four-passenger sporting model with 127-in. wheelbase and listing at $1,750

New Six Possesses Many Points of Distinction —Chassis and Body Well Coordinated— High Finish Combines with Sound Conventional Design

THERE are some who consider it difficult to produce a really distinctive automobile from standardized parts and it is, in fact, not easy. While anyone can build a sound car from reliable components, it remains for the few to effect the best combinations, and many a body is kept from being really excellent by a few small blemishes of design or finish which can only be eliminated by painstaking care. In the evolution of the Jordan this truth has been realized, with the result that the car has not only a character of its own, but a pronounced distinctiveness apparent at the first glance and intensified by a close examination.

Every Need Considered

In starting to produce the Jordan, consideration was given to almost every sort of ideal. The requirements of the world and his wife were analyzed, argued over, tabulated and, finally, coordinated. Before any work was done on the car a list of features was prepared stating in detail every point which had to receive consideration. It was the aim of the Jordan Motor Car Co., Cleveland, Ohio, to produce a machine which lacked nothing, in which the mechanical arrangement was above criticism, the body lines just at the right pitch of fashion and the finish of a custom-built quality. The precise extent of the success achieved may be judged by the illustrations and by the description of the car which follows, but it may be summed up by saying that the Jordan immediately appeals both to the man with long automobile experience and to the individual with none.

High-Grade Parts in Chassis

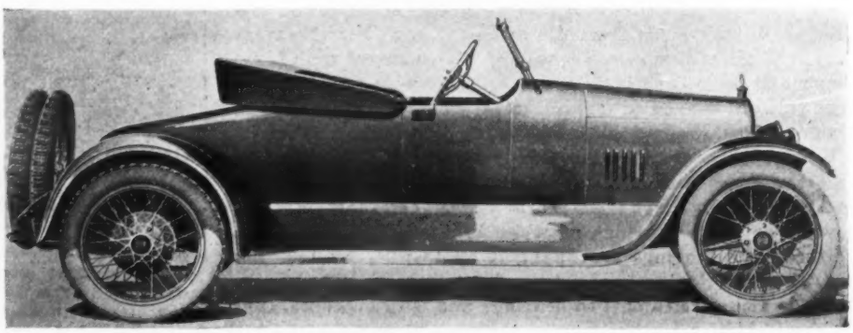
Not a unit of the chassis is untried and the specification is quite conventional, its noteworthy feature being that each component ranks high among its kind, and is the best model built by the parts specialist in question where there is any choice. Motive power is supplied by a six-cylinder Continental engine 3½ by 5¼ in., this being the aluminum crankcase type and the power plant is completed by a Brown-Lipe gearset and a Brown-Lipe multiple dry disk clutch. As to the engine accessories these include Bosch magnetic ignition, Bijur two-unit lighting and starting and a Stromberg carbureter.

As can be seen from the illustrations, the hood has plenty of width and depth, the result being that the mechanical inhabitants of the bonnet are no more cramped than the human occupants of the car body. Every essential is accessible readily.

Both front and rear axles are Timken products, the drive, of course, being by spiral bevel, and the frame is of deep section to give rigidity and enable the firmly-built body to keep free from looseness after long use.

The bodily comfort of the passengers has been studied with especial care, and a short trial of the car enables it to be stated with conviction that the ease of riding is very much above the average. It is not too much to say that very few cars indeed ride as well as does the Jordan. This desirable quality is attributable partly to the springs and partly to a special feature of the upholstery. Taking the former first, they are half-elliptic front and rear, the back springs being 59 in. long and almost perfectly flat when the load is on them. They run beneath the axle and the rear end of the frame is brought well down in a sweeping curve to carry the shackles. This low hanging allows the frame to be brought fairly close to the ground, and the flatness of the springs gives lateral strength to resist rolling action, of which there is remarkably little.

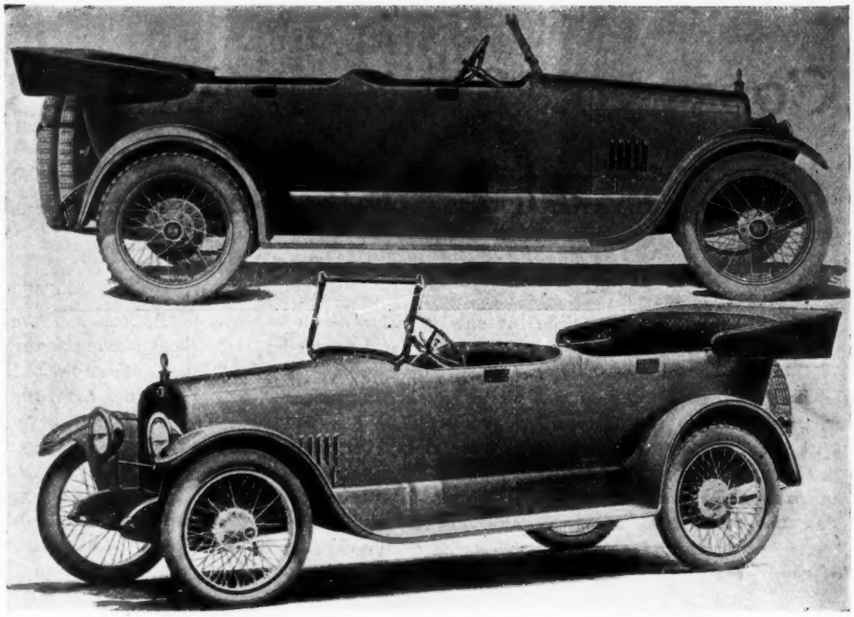
In the seat cushions the Marshall spring is used. This has been developed for high grade furniture and now makes its first appearance on an automobile. The usual nucleus of a cushion is a couple of wire frames separated by a number of large springs coiled to a big diameter. If one of these springs gives way under the stress of use, there at once appears a hollow in the cushion, because each spring supports a large area of leather. In the Marshall construction the springs are much smaller and a great number of them are used. Each little coil is sewn up in a canvas container and scores of the springs are bunched together. A little padding then goes over the top and then the leather, so that every square inch of the cushion has individual support. Owing to the number of springs used each one can be soft, so that the effect is equivalent to a pneumatic cushion, though with less bounce. Another thing that makes for comfort is the shape of the seats, for this has been worked out so that the height and depth of each and the angle of the back is just



The roadster model sells for $1,650, the same price as the seven-passenger touring car

right. The rear seat suits the woman of average stature, the front seat the average man, and to allow for variations in the stature of the driver, the pedals are adjustable over a wide range. It is specially noticeable in the front compartment that the wheel and the door are in such proportion that any man can get into the driving seat from the left side without any difficulty, even when wearing a heavy coat.

Speaking of the driver's comfort leads naturally to a comment on the placing of the gear shifting and brake levers. These are within easy reach without stooping or leaning forward, and the two are far enough apart to make the chance of a mistake extremely slight. The gear lever is carefully fitted so that it moves easily, and the clutch needs only a light spring. Also the long flat rear springs and the Hotchkiss drive cause very little variation in the relative positions of the brake parts, so that there is little lost motion on the service brake pedal and a fairly light pressure exercises great stopping power. The frame is well narrowed in front so that there is a good turning lock despite the 127-in. wheelbase.

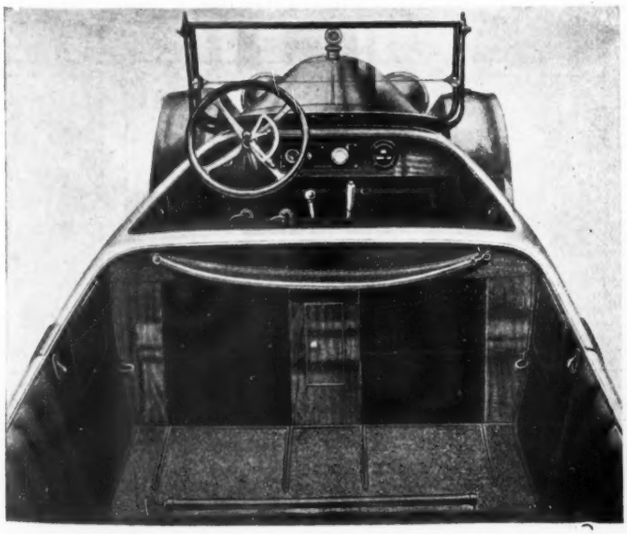


Two views of the Jordan seven-passenger touring car, which sells for $1,650

High Finish in Body

Returning to the body once more, it may be mentioned that the upholstery is all of the best hand-buffed leather, a thick yielding quality with the dull gloss that contrasts best with the highly polished mahogany work on other parts. The back of the front seat contains the folding seats which drop into compartments and are covered by leather curtains or flaps. All the rest of the seat back is light mahogany and is a regular custom style of job made of many pieces with matching grain. The center cowl effect is obtained with the minimum sacrifice of space the front corner of the rear door being cut into the edge of the center strip.

Across the back of the front seat is stretched a robe strap with a snap fastening, this being of brown leather to match the mahogany; there is a thick, soft tonneau carpet and a substantial foot-rest. These petty details of body equipment are mentioned so particularly because each one contributes to the completeness and very real luxury of the whole. It is in the choice of such detail that the Jordan has striven to raise itself into the custom-built class. The sloping windshield for example, is not just a windshield. Its proportions suit the car, its hinges work smoothly and the top sockets snap readily into place.



Plan view of the Jordan, showing smooth lines

In order to maintain the standard set the Jordan company is not planning a big output, but will use a very rigid inspection. In the main floor of the plant there is a special spot upon which each car has got to stand before it goes to the shipping bay. After every detail has had its individual inspection, after the car is reported as O.K. it has to undergo a final, painstaking checking up to insure that nothing has been overlooked.

Touring, Roadster and Sporting Models

There are three models listed, the first being a seven-passenger car and this will be ready for delivery starting Aug. 1. This car normally has wood wheels and sells for $1,650 so equipped, wire wheels costing an extra $100. Next there is to be a sporting model four-seated car on the same 127-in. wheelbase but lower built and this will have wire wheels and will cost $1,750. Finally the range is completed by a roadster costing the same as the seven-passenger model.

All types are fitted with Firestone rims and have 35 by 4½-in. tires, those on the rear wheels being of non-skid pattern while a Moto-Meter is included among the equipment.

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Radiator Cap Fittings

A SCREW thread is not the best thing to use for attaching a radiator cap. It is almost universal because it is the simplest form of attachment and it is cheap, but it is not nearly so convenient as a snap attachment like, for instance, the Packard design.

The cap should be held on so that it cannot be dropped and lost and there are many ways of making cheap, secure caps without a screw thread. Even when a screw is used there seems no reason why a short length of chain should not be fixed to the inside of the cap and to some interior place on the radiator, so that the cap, when unscrewed, would still be attached to the car. A chain might rattle perhaps, but if it did a bit of plaited fishing line would serve the purpose almost as well and would last for years.

Conveyor System Aids Big Production

Progressive Assembly Methods Cut Time and Labor—Three Classes of Chain Assembly—Group Assembly Also Used With Success—Manufacture by Time Table

By Leslie V. Spencer

HOW has it been possible for car manufacturers to produce nearly as many machines during the first half of 1916 as were built in the entire previous year, without adding to their factory areas or equipment anywhere near in proportion to the increase in production? The answer is that most of the large producers have adopted some form of the moving conveyor assembly scheme. This is the last word in automobile production, and is a great step forward, putting the building of motor vehicles on the same plane with the scientific manufacture of any one of hundreds of articles of commerce in the up-to-date plants of to-day.

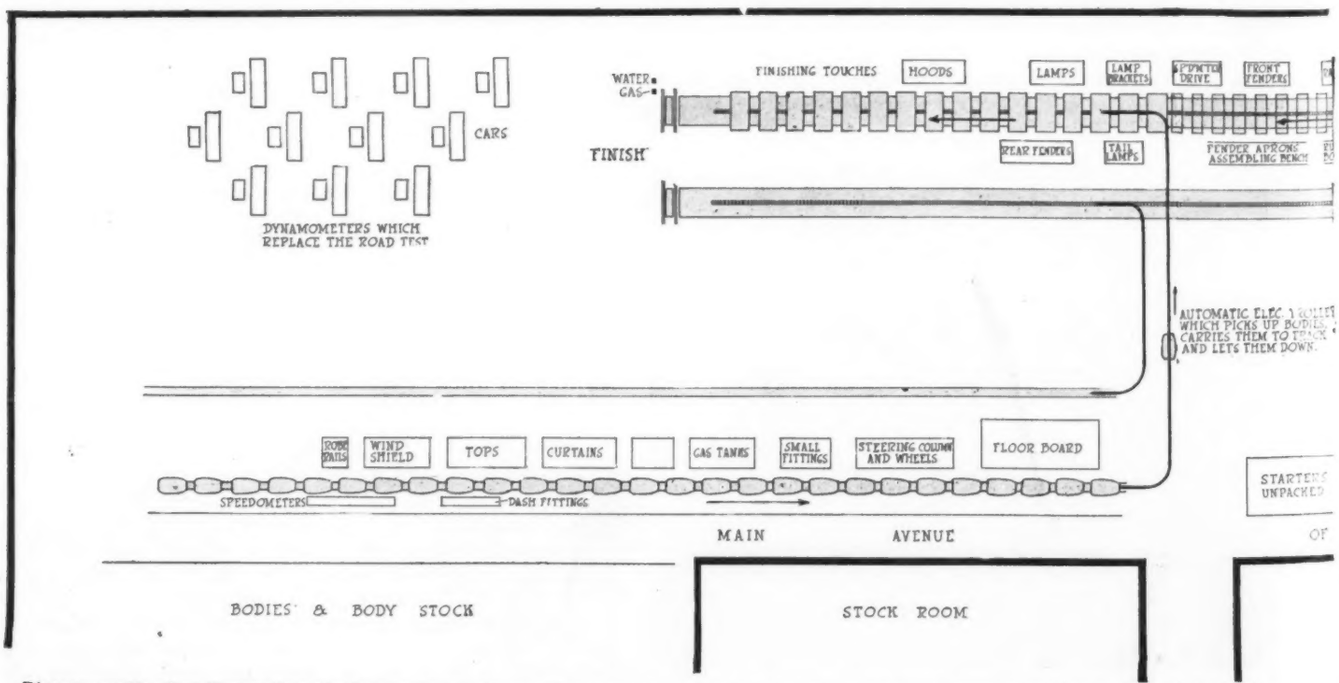
Few of us stop to think, in the present day of million-car-a-year output that only a few years ago it was an unheard of thing for any factory to turn out as many as 500 or even 300 cars a day. In 1912 Ford, always the leader in quantity output, built 78,440 cars, a daily average of about 260 cars for a 300-day year. Now we think nothing of Ford's 2000-a-day output, Overland's 1000-a-day schedule, nor of the large number of plants making well over 200 daily, such as Buick, Maxwell, Studebaker, Chevrolet and Dodge.

In all of these large-producing plants some form of the moving conveyor assembly arrangement is applied, and also in many of the plants that are very large producers, though not as yet in the 200-a-day class. This simply indicates that the industry recognizes the economy and large output possibilities of the moving chain method, and has taken it up almost universally where it is desired to build cars in any sort of quantity. In fact, the moving assembly is proving a big saving in cases where the output is as low as fifty cars a day.

Although there are three types of chain assembly, each best adaptable to certain classes and kinds of cars, the general scheme of all is the same, in that the chassis starts as a bare frame, and as it moves past the various parts, these are fitted to it by men who have specialized in the mounting of this one thing and know just how to go about it for quickest application. At the beginning of the assembly line are the piles of axles, driveshafts, springs, brake rods and other smaller parts. Each is far enough removed from the next so that there is time for the placing of one before the next goes on, unless they are parts whose application does not interfere, in which case two gangs, or even three may be working on the moving frame at one time. As the chassis moves along, other parts are added, until at the other end the machine has grown into a complete automobile ready for the road. In most cases, this moving scheme does not even except the fitting of the body—it is put in place just as any other part while the relentless chain moves steadily forward.

Three Classes of Chain Assembly

Chain assembly equipment may be divided into three classes, as stated, with respect to the method of carrying the car-in-the-making along. The Ford method is one way. In this case there are two iron rails on which the axles rest, and these slide along as the chain moves, requiring no truck for carrying the chassis even though it has no wheels of its own as yet on which it could move. Others of the big producers utilize the method of mounting the frame on a conveyor truck which is the car's constant companion until it reaches the finish end of the chain, a completed vehicle. In



Diagrammatic plan illustrating the layout of the Maxwell progressive system of manufacture and assembly which enables this plant to turn out in excess of 40,000 cars in 6 months

the third modification, the chassis is carried on a conveyor truck until it reaches the point where its wheels are attached. Then it finishes its growth on its own tires, being pulled along by a chain, however, with one of the wheels running in a guide groove to maintain proper alignment.

Obviously, each method has its advantages, and it would be incorrect to say that any one is better than the rest. The size and shape of the factory buildings, the type of car and the methods of assembly all have a bearing upon which equipment is used. If the building is long and narrow, pulling the cars end to end on their own wheels is allowable, because there is sufficient length to the conveyor to permit of this arrangement of the cars, but, where a larger number of vehicles are to be drawn along, they are carried on the conveyor trucks at right angles to the chain, affording a chain of given length a greater capacity than if the cars were end to end. At the same time, however, this adds somewhat to the width of the required space. Paige, Hudson, Overland, Studebaker, Dodge, Reo and Saxon are good examples of long and narrow plants that lend themselves to the end-to-end method on the car's own wheels, while the long and wide assembly building of the Maxwell company is admirably adapted to the type where the cars are side by side.

Aside from the room which the type of moving assembly in which the chassis is carried at least part way on its own wheels takes up, this method has the advantage of eliminating the conveyor trucks which are not only a big item of expense but add to the weight which the chain must pull, and hence to the necessary power. Besides, some scheme for returning the empty trucks back to the starting point must be devised, in most cases this problem being solved by the use of a tunnel under the conveyor, another chain pulling the empties back to the point where they are automatically returned to the assembly track, ready for reloading. However, most production men believe this to be the fastest method of progressive assembly, since it gives the conveyor the greatest capacity.

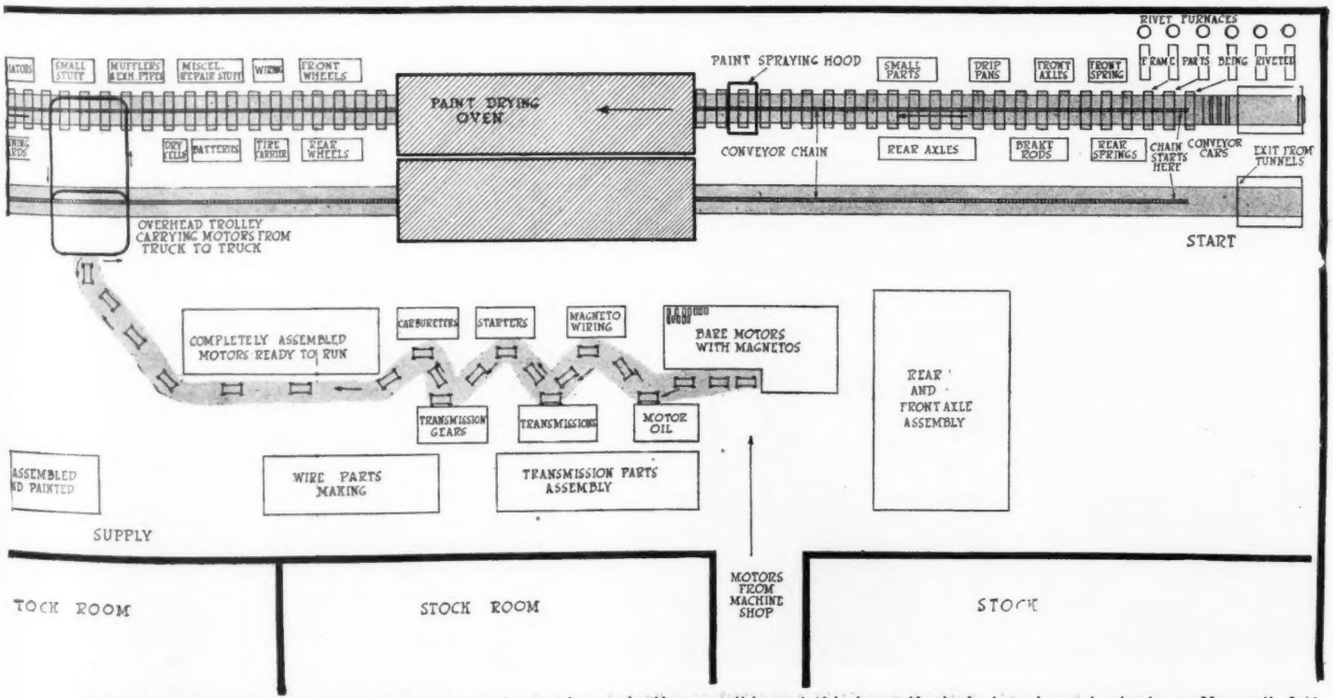
Some Have Group Assembly

There is another point for argument between these two types, this being as regards the convenience of working around the moving chassis. Those who have the end-to-end equipment believe that the workmen have more chance to get to all sides of the moving vehicle than would be the case if the chassis were carried at right angles to the chain. However, in the latter case, sufficient space is usually allowed between each chassis, so that the men have room enough to do their work.

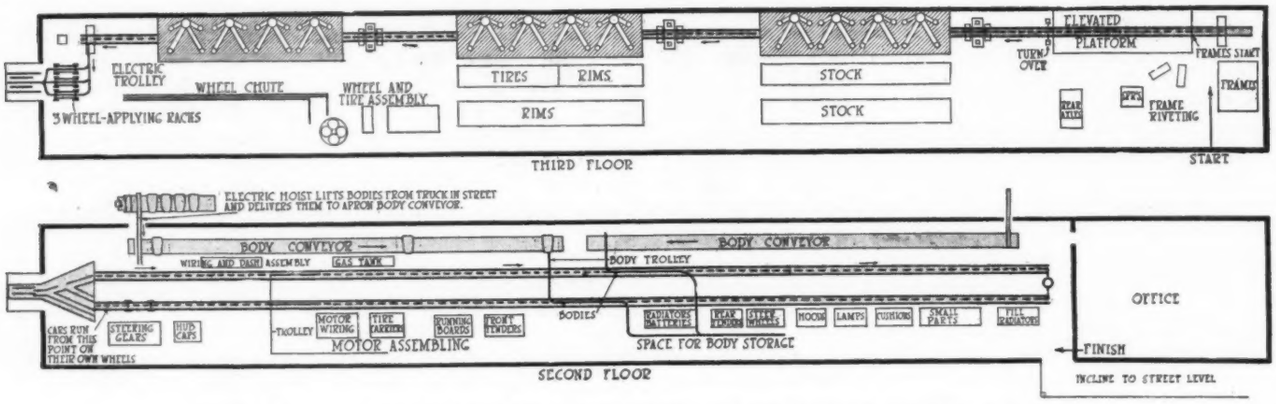
It might be well here to call attention to the fact that moving assembly of this kind is not favored by every large factory, such well-known plants as the Cadillac and Chalmers adhering to what might be termed group assembly. In this scheme crews advance the chassis step by step and each individual man is usually familiar with all of the operations required in that step. This is in contrast with the usual moving chain assembly proposition, because in the latter each man has a particular bolt to tighten on each chassis or a special part to put in place, and after he gets that one thing done, his responsibility, so far as that particular machine is concerned, is over. Where group assembly is employed, each man is familiar with all the operations that are necessary to carry the car one or more steps farther toward completion.

It is argued by those who favor this method that the men become more intelligent individuals and less like machines, and hence a better assembly is obtained. They also think that when a man finishes the particular thing he is doing he will help some other in his own crew to the end that the part or chassis, as the case may be, may be advanced to the next crew as quickly as possible. There are, of course, other arguments both ways, but the march of progress of car production seems to indicate that the trend is toward the more machine-like method of moving the chassis relentlessly.

Of course, the big advantage of moving chain assembly are that it greatly speeds up the production by absolutely regulating the output in accordance with the speed at which the chain moves. The factory production man in charge knows how many men it requires to put together a given number of cars when the chain runs at a given speed, and if the demands of the sales department are for a greater number of cars, he can positively guarantee to turn them out by running the chain faster and if necessary, increasing the number of assemblers, granted, of course, that he is not held up for lack of parts. There is a limit to the capacity of any chain equipment, but the method takes a great deal of



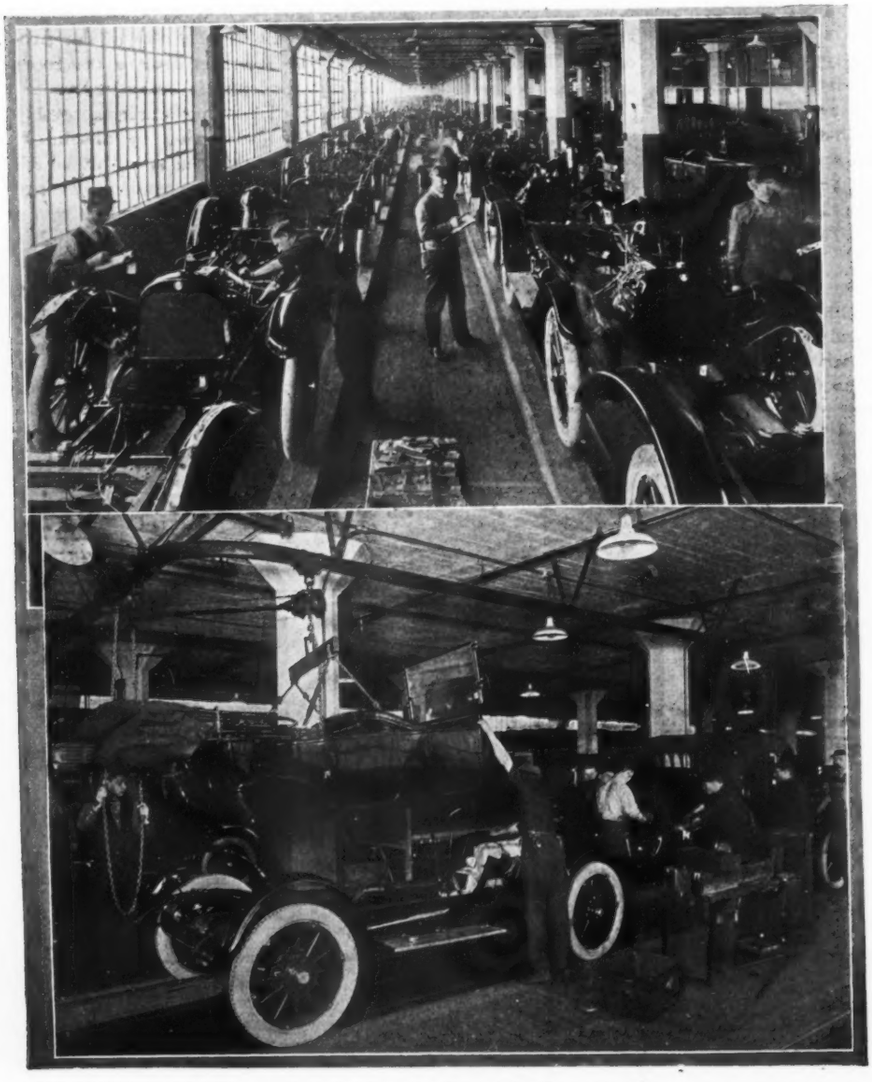
Modern progressive assembly methods have made big production possible and this is particularly true in such plants as Maxwell, for example, where the scheme diagramed above is used



Third and second floors in the Paige factory, where the chain system of assembly is employed

the uncertainty out of the production end of the business. As each man becomes more expert at doing his part, it has been found that the chains can be speeded up without materially increasing the number of men employed. The piecework system of paying the men is a big factor in increasing their efficiency, and hence the output.

Monorails play an important part in these modern assembly plants. All heavy parts are brought to the points where they are to meet the on-coming chassis by means of these overhead tracks, this applying to such units as the front and rear axles, engines and bodies. In some cases the work has been so far perfected that electric trolley systems are now installed which automatically convey the units from the stockroom or other point of supply, direct to the points where they are needed, over the moving chain, and hold them suspended ready for lowering into place with the least manual effort.



Men and methods in the Dodge plant which enable this concern to turn out more than 200 cars for every working day

In order that greatest general efficiency can be promoted, it is usually the practice to assemble as much to each unit as possible before it comes to the final chassis assembly, making it necessary to do the least number of operations on the moving embryonic car. Thus, the wheels come to the point where they are to be applied with the tires in place; bodies arrive with as much of the wiring on them as it is possible to place before they are attached to the frame; motors are possessed of all their equipment, with carbureter and ignition control rods waiting only to be connected to the steering gear to be entirely assembled, and so on. Several of the big plants even have machines for attaching the tires to the wheels, this being an example of how all parts of the manufacture are carried out with as much dispatch as is evidenced at the final assembly itself.

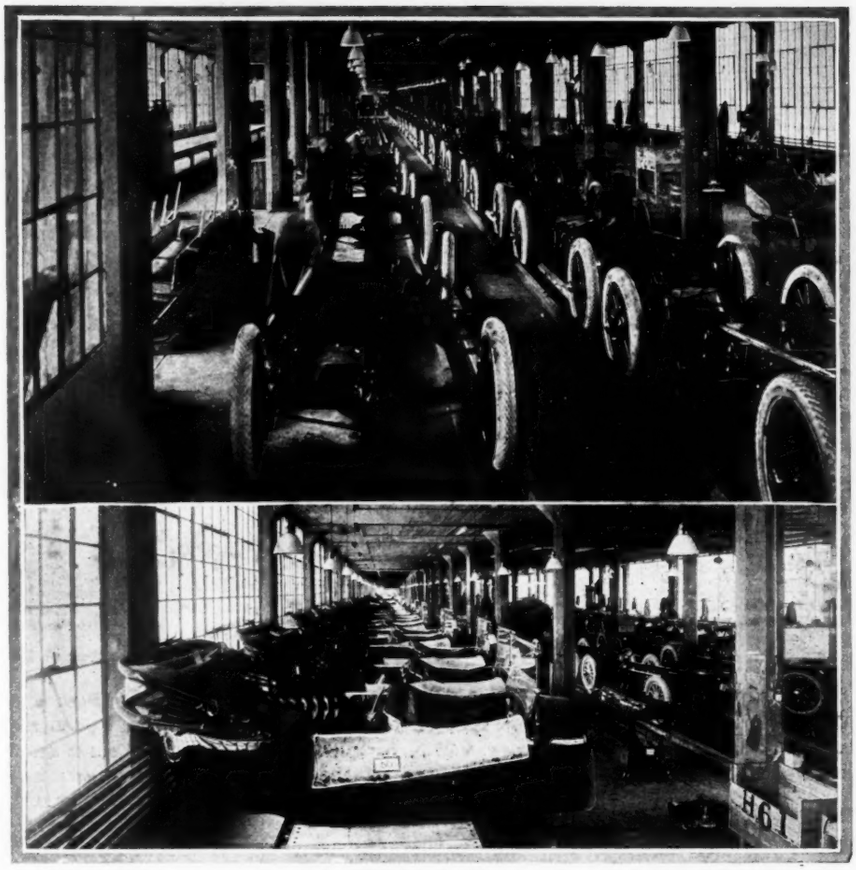
Where the scheme of carrying the car through its entire assembly on a conveyor truck is employed, great ingenuity has been displayed in devising means for quickly and almost automatically unloading the finished car from the truck onto its own wheels, to be driven to some other point under its own power for final test. Usually, when the conveyor truck gets to the unloading point, track, conveyor truck and automobile are all lowered sufficiently for the car's wheels to rest upon the floor, the truck that has been its companion up to this time dropping down, and automatically engaging the return chain that is to pull it back underneath the assembly chain to the starting point.

An advantage of the method where the wheels carry the chassis part of the way is that no mechanism for un-

loading is necessary, but there must be means, however, for lifting the frame from its conveyor when the wheels are applied—usually an overhead hoist. Maxwell and Packard both have very good schemes for lowering the car onto its own wheels, the former lowering the whole thing to the floor level, whereas Packard runs the car onto an incline that engages the wheels while the conveyor truck drops below and out of the way. Paige might be mentioned as a good example of the method where the wheels are applied half way of the assembly journey and carry the car on to the end. An electric hoist picks the chassis, sans wheels, from the truck, lowers it to a wheel-attaching platform, and after these are in place, drops it through a chute to the floor below where the vehicle begins the last part of its journey on its own tires. Hudson utilizes cleverly a freight elevator for removing the car from the assembly truck. This does the work without damage.

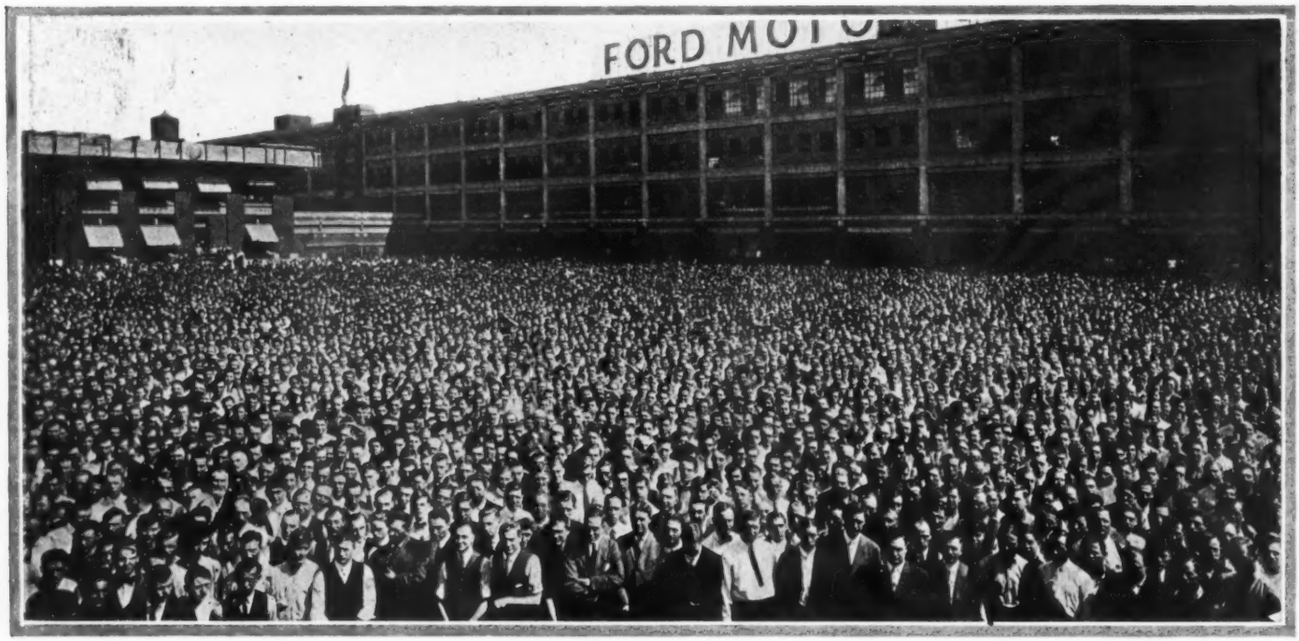
Chassis-Painting Difficulties

Chassis painting presents some difficulties for the chain assembly. When the frame, axles, springs and other parts are put in place, they are minus paint, yet the chassis meets the body with its enamel baked on and dry. Thus the chassis is first painted and finished by inclosing a length, or sev-



Paige-Detroit chain system in which the body and chassis run along parallel lines on separate conveyor systems allowing of easy transference of bodies to chassis

In spite of big production schedules manufacturers are not neglecting to test every unit. Shown above is the dynamometer room of the Cadillac Motor Car Co.



Some of the 32,000 workmen which help to make the Ford production of 2000 cars a day a possibility

eral lengths, of the chain and track within a baking oven of sufficient length that the enamel, sprayed on just before the chassis enters this part of its journey, will be completely dry when the chassis emerges at the other end of the oven.

Drying Oven Takes Space

These drying ovens fill a great deal of the conveyor length, but they are proving a saving wherever used. In some cases there are several sections of oven between which are stationed men who spray the chassis ready for its next drying in the oven following. Packard has a very elaborate system of doing this, first applying the ground coat, then passing the chassis through a 120-ft. oven, following which a color varnish is sprayed on and then another oven 130 ft. long again dries the chassis as it moves along. Emerging from this heat, the chassis gets a clear varnish and is then conveyed on its assembly truck to a storage side track, where it waits usually about a day for complete drying before being placed on the final assembly chain. This, however, is one of the few plants where there is any wait between the time the frame first starts on the moving chain until the completed car comes off the opposite end.

Paige utilizes a 735-ft. conveyor on the top floor of its long main building exclusively for the assembly of the frame and axle parts and painting. Having added the axles, etc., the chassis gets its first priming coat in 2¼ min., and then consumes 1¾ hr. to pass through an oven 134 ft. long that is kept at a temperature of 180 deg. Still moving, it emerges from this first oven and the space between this and the next oven of equal length is traveled in 36 min., which is sufficient time at the speed at which the chassis is moving, to allow complete drying and spraying with the next coat for entrance into the second oven. These two ovens take care of the chassis paint and it is then ready for its wheels. Somewhat similar to this are the series of ovens, open spaces and spraying stations used by the Hudson company. Maxwell is an example of still another modification, the chassis receiving one thorough spraying coat and passing for a distance of 100 ft. through a single oven.

Speed of Conveyor Systems

To give some idea of the extent to which the moving chain assembly has been developed, the following data on systems in several of the well-known plants may be of interest.

Some Data on the Chain Conveyor Systems

PACKARD

Total length of moving chain, 1200 ft.
Speed of chain, 12 ft. per min.
Axles, motor and chassis paint, conveyor chain, total length, 792 ft.
Final assembly chain, 408 ft.
Capacity, final assembly chains, 40 cars at one time.

MAXWELL

250 cars in 9½ hr. per assembly track.
Length of conveyor, 800 ft.
Capacity at any one time, 100 cars.
Time for completing car from start to finish, 3 hr. 15 min.
Time for fitting a spring, 1½ min.
Fitting rear axle, 3 min.
Speed of chain, 40 in. per min.

PAIGE

Frame Conveyor

Speed, 18 in. per min.
Length of conveyor, 735 ft.
Load pulled by conveyor when full, approximately 75 tons.
Capacity at 18 in. per min., 150 complete cars in 10 hr.

Return Truck Conveyor

Speed, 20 ft. per min.
Length of conveyor, 760 ft.

Ovens

Three.
Length, 134 ft. each; width, 18 ft.; height, 6 ft.
Temperature, 180 deg. Fahrenheit.
Heated by steam.
Temperature can be raised or lowered to suit conditions of production.
Total chassis and final conveyor speed, 24 in. per min.

Double Body Conveyors

Speed, 10 ft. per min.
Length, 350 ft.

New Magneto Very Simple

No Wires on Armature—Aluminum Die Cast Parts Produce Light Weight Machine—No Carbon Brush

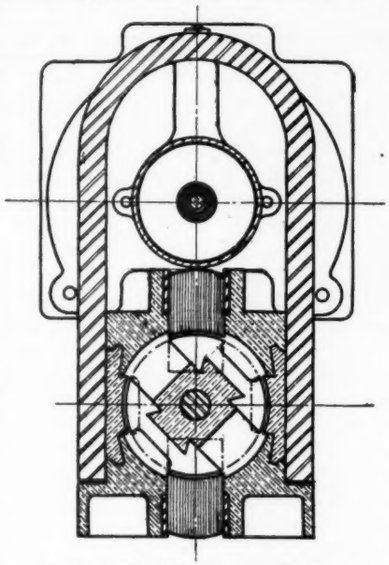
THERE are many different ways for making successful magneto machines and a new type just introduced by the Berkshire Magneto Co., Pittsfield, Mass., has a number of features differing from the ordinary.

Firstly, one of the principal claims made for this instrument is that while it gives a strong spark at low speeds and thus insures easy starting, the fierceness of the discharge increases at a lesser rate than the speed. It is, of course, possible to have too hot a spark. If the high speed discharge is very intense it has a destructive action on the points of the spark plug and the breaker points and puts an undue strain on the condenser and insulator.

Big Low-Speed Spark

Owing to the peculiar magnetic circuit of the Berkshire instrument it is claimed that the discharge current reaches one-half of its maximum amount at 50 r.p.m. while at 150 r.p.m. it has attained 80 per cent of the maximum intensity. This means that the spark produced at 150 r.p.m. is practically identical with the spark at 3000 r.p.m. or over.

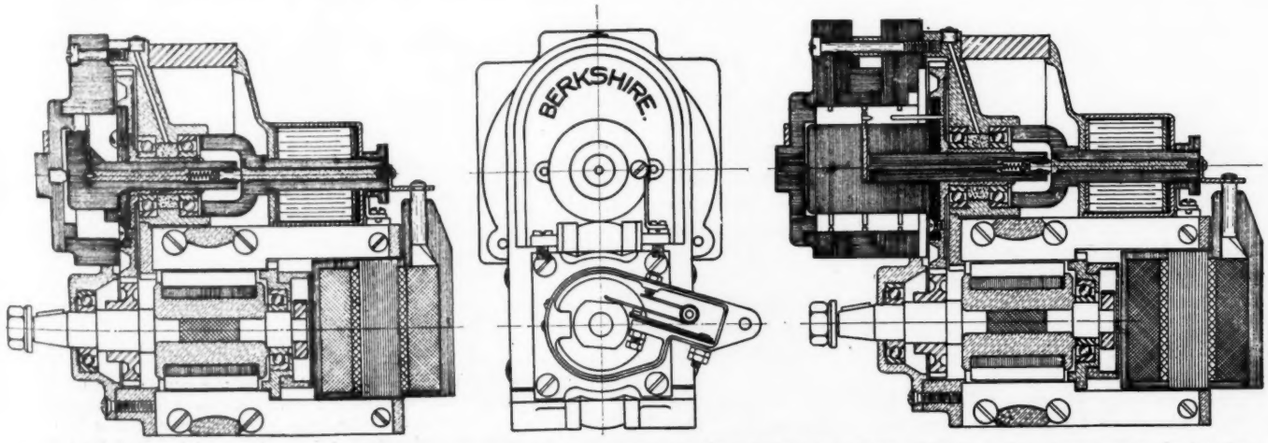
The reason for this action is not easy to explain, but some idea of the action may be obtained when it is stated that the magnetic circuit in the instrument is such that increasing magnetic flux caused by increasing speed meets with an automatic opposition. The action may be likened to that of the endeavor to force water through a length of pipe. The resistance to flow through a small pipe is such that above a certain speed the amount of extra pressure required to increase the flow is very great indeed. Another way of regarding it is to think of an electric condenser which can only hold a certain amount of electricity. With any condenser there is a limit of charge which cannot be exceeded. Similarly in the Berkshire magneto an increase in speed of 2000 per cent increases the flux through the armature by only 25 per cent.



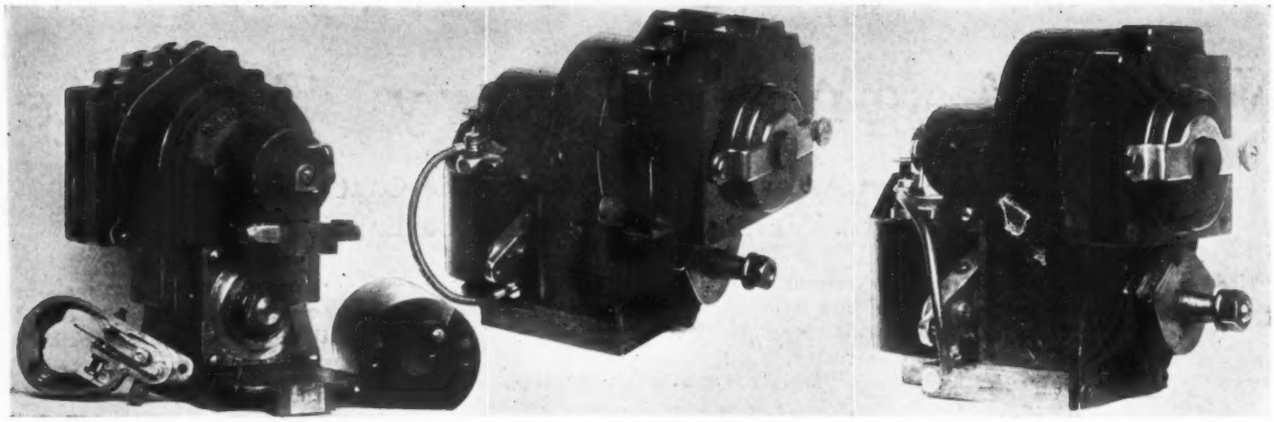
Section of Berkshire magneto showing unwound armature construction. The two main pole pieces seen right and left, and the laminated, supplementary poles top and bottom are locked together by being cast integral with aluminum alloy

In the Berkshire magnetos there are no windings, either low tension or high tension, on the armature. In fact, the only revolving member which carries electric current is the internal portion of the distributer. The horseshoe magnet has two poles and two supplementary poles of soft iron are placed in the mouth of the horseshoe being magnetically insulated by aluminum. In the transverse section drawing of the instrument it can be seen that there are four deep grooves in the armature which means that the four iron portions of the armature correspond to the pair of main poles and the pair of supplementary poles in the field magnet. The iron parts of the armature are held together and magnetically insulated also by aluminum, the driving shaft and the armature pole pieces being locked together in a die casting process.

Returning to the magnets the supplementary pole pieces which are made of soft iron laminations are also die cast into their aluminum cases and it can be seen in the lengthwise section that the laminations are brought a good distance back of the horseshoe. It is between the ends of these projecting supplementary pole pieces that the coil unit is placed. This consists of a soft iron core having a low tension and a high tension winding, so there is a magnetic circuit from one of the supplementary pole pieces through the core of the coil and back via the other supplementary pole. When the armature is in position the magnetic circuit passes from one main pole through a segment of the armature to one of the secondary poles, thence through the core of the coil unit and back via the second supplementary pole, opposite armature segment and south main pole.



Left—Section of two-spark model of Berkshire magneto for four or six-cylinder engines. Right—Section of a four-spark model for twelve cylinders. Center—View from rear end with coil unit removed and breaker box cover taken off



Left and Center—Four-spark, twelve-cylinder Berkshire magneto. The left view shows the way the coil unit and breaker mechanism can be removed. Right—A two-spark pattern for four cylinders

It is now possible to explain the condenser effect of this circuit. When the armature is rotating the passing of the iron portion across the faces of the pole pieces sends a series of magnetic "charges" into the projecting portions of the supplementary poles. Through the air surrounding the latter a certain amount of magnetic leakage can take place, so we may regard the upper and lower supplementary poles as the inner and outer coating of the condenser. The air gap provides a constant leak or discharge resistance so that the flux which passes through the core of the coil unit cannot be increased above a certain point.

This construction lends itself very readily to the four-spark system and the Berkshire company expects to make a number of this pattern. The four-spark machine, of course, runs at half the speed of the two spark type. It is slightly lighter than the two-spark model. The range of Berkshire machines includes a two-spark pattern for four-cylinder engines and for six-cylinder engines, while four-spark models are made for four-, six-, eight-, and twelve-cylinders.

Intensity Restrained at High Speed

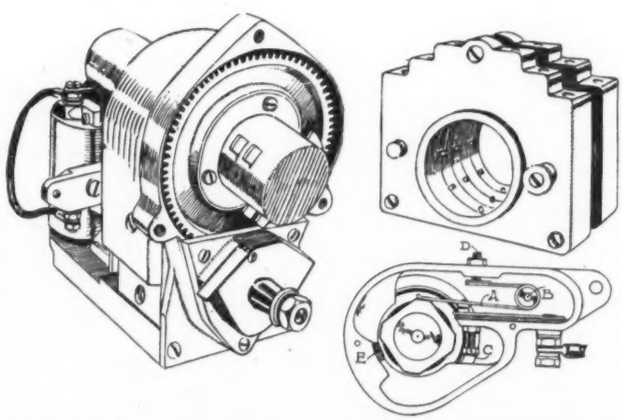
The makers point out that one great advantage of the four-spark system is that it provides a six-cylinder magneto with a very wide range of adjustment, 45 deg. being easily obtainable, this being 45 deg. on the crankshaft. The wide range coupled with the automatic limitation of spark intensity gives, in the Berkshire magneto, it is claimed, all the advantages of battery systems at low speed and of wound armature magnetos at high speeds with a practical elimination of the ordinary disadvantages of either.

Although they are making the two-spark type for use on engines already arranged of this kind of instrument, the Berkshire company believes very strongly in the advantages of the four spark. Fitted to a four-cylinder engine the four-spark machine only requires to run at half the speed of the crankshaft. With a six-cylinder engine at three-quarter crankshaft speed and at crankshaft speed with an eight, while the single magneto will fire twelve running 1½ to 1. The magnet used is a little larger and more powerful than would be required with a two-spark instrument in order to insure a strong spark at low speed but the self controlling action already explained allows the instrument to be designed for the slow speed spark since the possession of a hot discharge at 50 r.p.m. does not mean there will be an excessive current flow at 3000 r.p.m. or over. In every case the possible range of spark adjustment is doubled when the four-spark instead of two-spark machine is used.

Turning to some of the mechanical details of the machine this is made clear by the drawings and photographs. The breaker mechanism is rather interesting as the system of adjustment is somewhat novel. The spring *A* is one continuous piece of steel wrapping around the pin *B*, adjustment being provided at points *C* and *D*. The lower, insulated, platinum point is carried on a small strip of spring steel shown in the sketch, this being backed by a stout strip of red fiber. The upper screw *D* adjusts the tension of the breaker spring and the lower screw *C* controls the position of the breaker points. The whole breaker mechanism is easily removed for cleaning or adjustment. The coil unit can be pulled out by removing two screws and to have the parts in the condition shown in the photograph occupies something like half a minute.

Referring to the sectional drawings, it will be seen that a condenser is contained in a small round case and mounted on top of the upper supplementary pole piece, thence the high tension current goes to the central member of the distributer which carries a number of brass segments corresponding to the number of cylinders. In the outer part of the distributer are brass pins and between the pins and the rotating sectors there is no actual contact, the current jumping across a very small air gap. The safety gap is contained within the distributer and can be seen in the section of the twelve-cylinder magneto. The machines are characterized by light weight and extremely robust mechanical detail.

Electrically and mechanically the simplicity of the Berkshire magnetos renders them excellent manufacturing propositions. The solid, unwound armature, for example, can be made a close fit within the magnet without any difficulty, the coil unit is easy to wind and nearly all the non-magnetic parts lend themselves readily to die-casting.



The Berkshire magneto taken apart—A is one continuous piece of spring steel passing around the pin B, to the tension adjusting screw D. C is the breaker point adjustment and E a little wick lubricator which keeps the cam just greasy. The pins of the distributer are shown above and the sectors which spark to the pins in the view at the left

Peru Rear Axles in Two Styles

Easily Adapted to Car Makers' Needs—A Front Axle

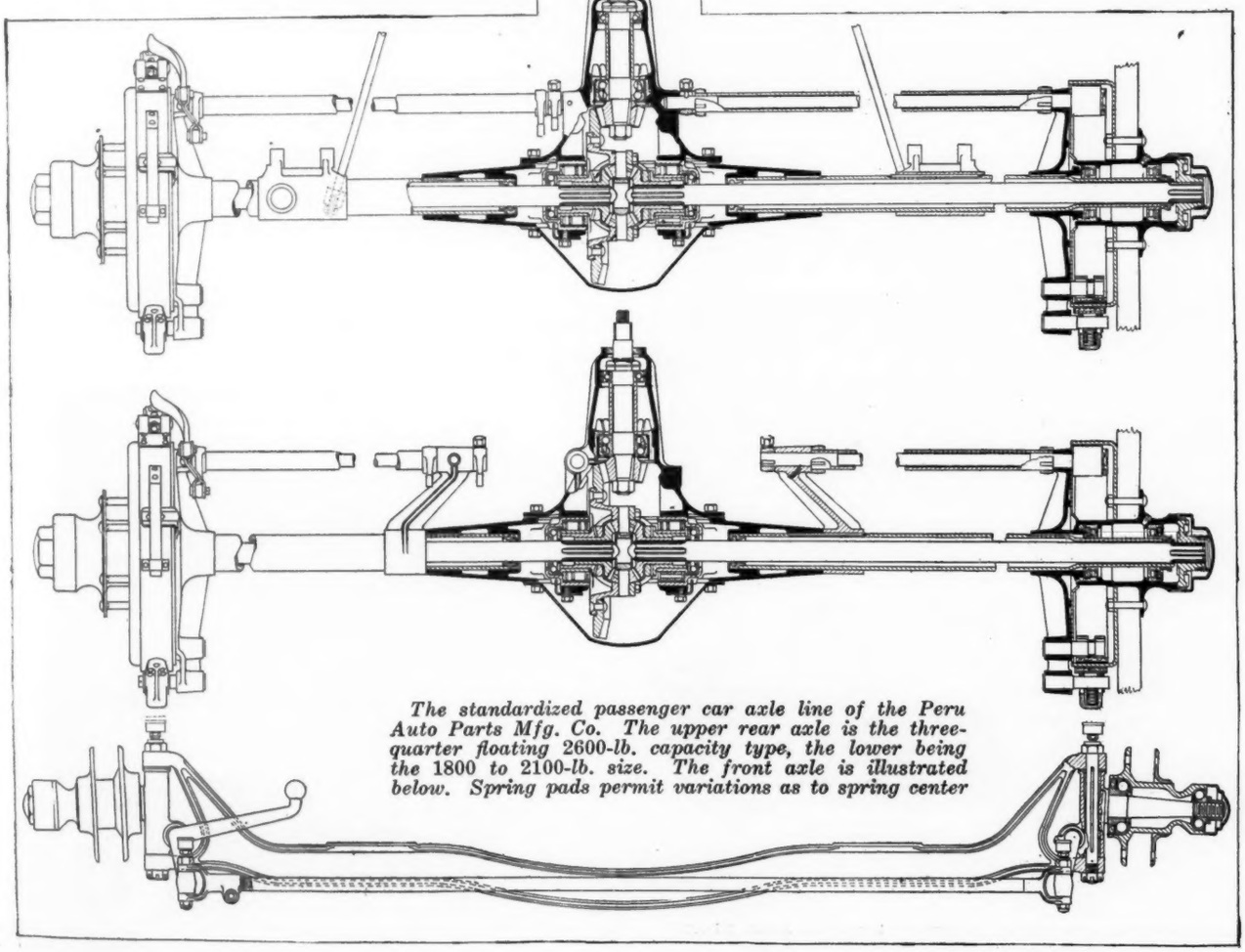
FOR current models the Peru Auto Parts Mfg. Co., Peru, Ind., is providing two styles of passenger car rear axle and a front axle. This is a standardized line, and, although fixed as far as fundamental design is concerned, can be varied to meet the fittings of different manufacturers as employed on their various models of cars.

The front axle is a conventional type, being a drop forged I-beam section from 1035 S. A. E. heat-treated steel. This steel has a carbon content of 0.35 per cent, from 0.50 to 0.80 manganese with maximum phosphorus of 0.045 and sulphur 0.05. The steering ball is forged integrally with the steering arm and cup and cone bearings are used in the hubs. The tie rod is of steel tubing having an overall diameter of ¾ in. and a wall thickness of 3/16 in. The spring pads are forged integrally with the front axle and they can be proportioned to accommodate variations in customers' requirements as to spring center.

The rear axles are made in two capacities; the 1800 to 2100 lb. size is the floating type and the larger, or 2600 lb. size, is a three-quarter floating. Both of these types are illustrated in the accompanying drawings. The lighter axle, which is a floating design, has a malleable center housing with a pressed steel cover allowing for the removal of the differential as a unit without dismantling the axle or removing it from the car. A feature of this axle is that universal adjustment is provided for both differential and drive pinion. The wheels are carried on roller bearings and the differential radial bearing is also of the same type with a ball thrust also provided.

As will be noted in the illustration, the pinion shaft is carried on a single row ball bearing at the forward end and on a double row ball bearing at the pinion. The reduction between the pinion and the ring gear is 4½ to 1. The differential is a four-pinion type and the ring gear is of heat-treated carbon steel. The drive pinion is nickel steel heat treated.

The side or driving gear of the differential are broached to take the standard S. A. E. six-spline axle shaft. Both these shafts and the pinion shaft are of high carbon steel heat treated to give them an elastic limit of 120,000 lb. The driving dog is of drop-forged steel which has specifications cor-



The standardized passenger car axle line of the Peru Auto Parts Mfg. Co. The upper rear axle is the three-quarter floating 2600-lb. capacity type, the lower being the 1800 to 2100-lb. size. The front axle is illustrated below. Spring pads permit variations as to spring center

responding to S. A. E. steel No. 1025. This is a 0.25 carbon content with 0.65 manganese, 0.045 phosphorus and 0.05 sulphur. This is pressed on to the axle shaft under hydraulic pressure and the drive is taken through six splines.

The brake drum is of pressed steel and has a diameter of 12 in. The brakes are double, having both an external contracting and an internal expanding set of 1¾ in. face width. A choice of connecting lever positions is provided, thus allowing for a wide range of variation in the actual mounting of brake linkage. There is also a wide permissible variation of possible spring centers as these are furnished according to the requirements specified and the type of spring hanger is also optional.

The construction of the axle leaves a considerable length of clean tube and it is this which permits of the variation in mounting of the spring pad. The tube itself is of heat-treated carbon steel and it is provided with thrust rods and diagonal brake rods to take care of the stresses which would occur in cars with long propeller shafts. The axle can be furnished for either a unit power plant, Hotchkiss drive or with flanges for rear axle transmission. When furnished for long propeller either a ball joint or a yoke connection can be provided as desired.

Grease Leakage Prevented

One of the features of this axle which should appeal to owners is the special provision made to prevent leakage of grease from the differential housing down along the axle shafts to the brake drums. There is a packing box located at the inner end of the tube which holds the lubricant in the gear well and any grease which should work its way past this would still be held separate from the brakes by the arrangement at the outer extremity and the provisions for tightness at the outer and inner bearing. The argument against the floating type of axle is that the bearing spread is often narrower than it should be. This objection has also been overcome by having the distance from center to center of these bearings quite far apart.

The three-quarter floating, 2600-lb. axle is similar in some respects to the smaller model as far as materials are concerned, although this larger axle is fundamentally a different design. There is a malleable center housing with a pressed steel cover and this arrangement, as in the smaller design, permits the removal of the differential as a unit without taking down the axle. There is also provision for adjustment of both the differential and the driving pinion, allowing wear to be taken up in any direction and to compensate for play between the gears after wear.

Roller bearings are used in the wheels. The differential radial bearing is a roller bearing also with thrust taken through a separate ball thrust bearing. The pinion shaft mounting is similar to that in the smaller axle as there is a single ball bearing at the forward or driving end with a double row ball bearing to take the load and thrust at the pinion. The ratio in this axle on the standard model is 4 to 1 and the differential is a four-pinion type.

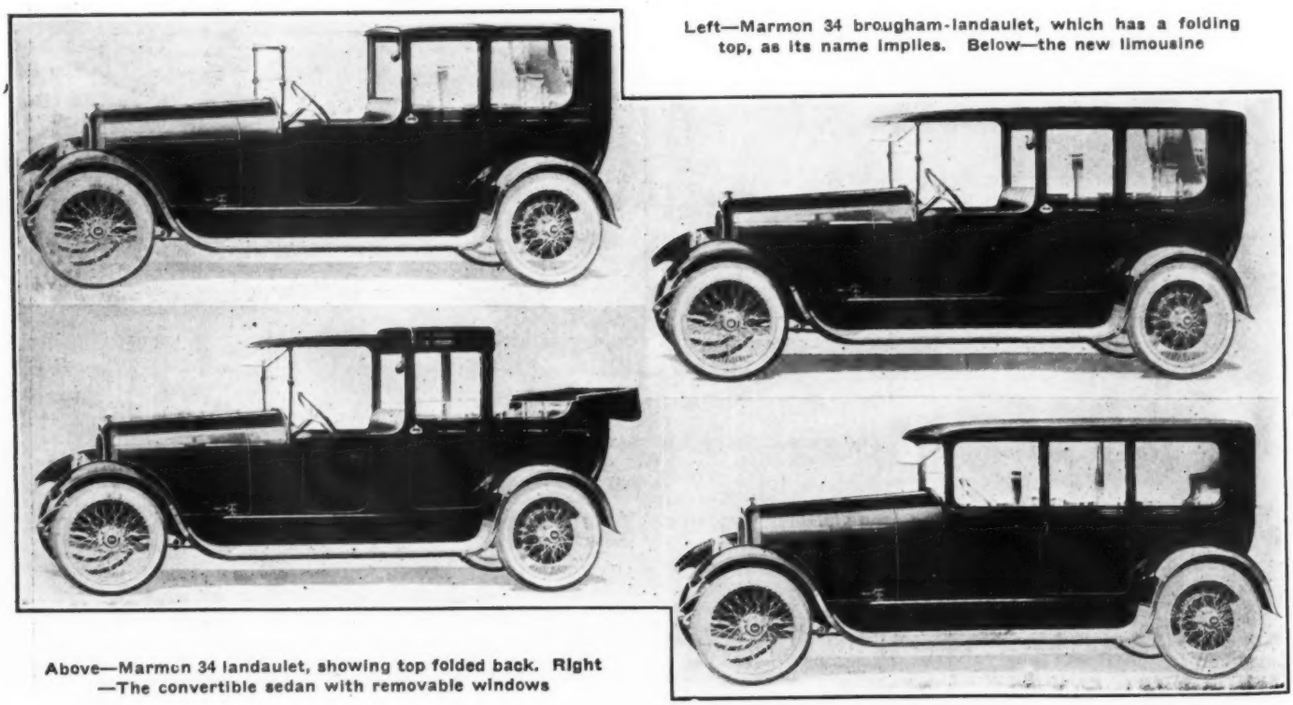
As regards materials, 3½ per cent nickel steel is used for the pinion while the axle shafts are of special chrome nickel steel made from hot-rolled, heat-treated stock. The pinion shaft is of high carbon steel, heat treated, and the axle tubes are also of carbon steel, heat treated. The side gears are broached to take the standard S. A. E. six-splined axle shaft and at the outer end the hubs are keyed to the axle shaft and drawn up on a tapered fitting. The brake drums are 12-in. diameter pressed steel with both an external contracting and internal expanding shoe. The face width of the shoes is 1¾ in.

Leeway for the Car Builder

As in the smaller axle, the designers have been careful to leave the car manufacturer as wide a limit as possible in mountings of springs and brake gear. The spring centers on this axle can have a variation within any reasonable limit and the type of spring hanger can be as the purchaser desires. The axle is provided with fittings for rigidity, having truss rods and diagonal brace rods for long propeller styles. The axle can be adapted to the unit power plant, Hotchkiss drive or rear axle transmission unit.

Marmon 34 in New Closed Body Styles

Left—Marmon 34 brougham-landaulet, which has a folding top, as its name implies. Below—the new limousine



Above—Marmon 34 landaulet, showing top folded back. Right—The convertible sedan with removable windows

The History of the Pneumatic Tire—11

Introduction of the Palmer Single Tube Tire—The Morgan & Wright Double Tube Hose Pipe—The First Puncture-Proof Types and Attempts with Pneumatic-Solids

The History of the American Automobile Industry—38

By David Beecroft

THE single tube tire, properly so called, was the Palmer type first made in 1892 and on the market in 1893 in which there was a homogeneous structure composed of a definite thickness of sparsely arranged cords or threads with the air tube inside and a thread outside with a valve for inflation. It possessed none of the characteristics of the hose pipe and its action under air pressure was to contract upon the rim and materially assist the same in folding it firmly thereto.

The Morgan & Wright Tire

The Morgan & Wright tire was what might be characterized as a double tube hose pipe, meaning that it was a hose-pipe tire in point of structure, with a slit 6 or 8 in. cut longitudinally on the inner side of the tire for the purpose of inserting a separate and separable air tube, said air tube having closed ends overlapping in the tire when in use. These two types last mentioned were the prevailing and mentioned constructions in use at this date with the so-called G. & J. clincher type of tires.

Between the years 1893 and 1900, Palmer tires or single tube tires and Morgan & Wright or double tube hose pipes were the accepted types in use on bicycles made in the United States, the Palmer occupying the high-grade field.

Quick Repair Methods Developed

Methods of quick repair were developed such as small syringes with needle points by which a thick gum could be introduced through a puncture and stop it by forming a wad on the inside. The tires were made of small diameter and therefore not likely to burst because the service was light and the inflation not great. So practically did these single tube tires perform their work that then as now the bicycle rider did not, as a regular thing, carry a repair kit.

Then, as now, however, to make security from puncture doubly sure, the protection strip of rubberized canvas between the air tube and tread portion of the casing was frequently suggested and was put on the market by the N. Y. Belting & Packing Co. in 1892, and Latulip of Syracuse used a strip of rawhide.

The self-healing tube made its appearance in 1892. The Luburg Mfg. Co. of Philadelphia brought out an air tube having an inner coating of viscous rubber which would close together after being punctured. This idea has been worked out in many forms since, some inventors putting this viscous rubber between two thicknesses of air tube material; others have rendered it better able to stop a large hole by mixing fibers of some kind, such as feathers, with this viscous material. The cost of this additional construction with its added weight was undoubtedly a considerable objection, and it seems not to have been common.

The First Puncture-Proof

The first puncture-proof tire to be publicly exhibited and to attract much attention was shown by Phelps & Dingle at a New York bicycle show in the winter of 1892-3. This consisted of an inner tube of printer's roll jelly which was elastic enough to close up an ordinary puncture so fully that very little leak occurred and which could be healed and permanently made tight by ironing it with a hot flat iron which would slightly soften the gum and join it together. The crowd around the Phelps & Dingle booth witnessing this wonderful solution inspired C. E. Duryea to do likewise and attract a similar crowd, which he did by pouring a half pint of pine tar disguised with citronella into a tire and inviting the puncture fiends to do their worst. Thus was invented the liquid self-healing device afterward patented by Duryea and used by the Buffalo Specialty Co., makers of Never-Leak, to control the self-healing business for 17 years.

The Pneumatic-Solid Type

In 1892 G. A. Burwell, afterward with the Lozier company, Cleveland, Ohio, invented a pneumatic tire, which, when deflated, served as a solid. This idea was frequently brought out and was exploited fully 10 years later by Munger for automobile use. Every attempt, however, met with failure because inventors would not recognize the unavoidable fact that the circumference of a tire is longer than its base. When deflated, the circumference rests on the part of the base prepared to receive it, but, being longer, there is an excess of material which must be gotten rid of and this can only be done by allowing the circumference to slip on the base or by folding in ridges.

The Rostrum

Likes Underslung Frame Design

EDITOR THE AUTOMOBILE:—Please publish an illustration of the Harroun heavy fuel carbureter, describing action, and give address of manufacturer.

2—The Mercer Automobile Co. built a car in 1915 similar to the previous model. Was it known as model M?

3—Is the Norwalk Motor Car Co. still in business? If not, when did they fail and where can parts be secured?

4—Why has the underslung principle been lost sight of by the prominent manufacturers? Was this construction more expensive or was there little demand for such a car? It did not appear freakish to me and was really as good looking as the best when on the market. It would appear that the present body designs could be carried out perfectly on the underslung car.

Anheim, Cal. R. E. H.

—The Harroun heavy fuel carbureter may be described as consisting of a type of carbureter having the center of the mixing chamber inclosed in an exhaust jacket and thereby maintained at a very high temperature. THE AUTOMOBILE has no information regarding the details of the latest type. The manufacturer is the Invincible Mfg. Co., Pittsburgh, Pa.

2—M was a 1914 car. The 1915 models were radically different.

3—The Norwalk Motor Car Co. of Martinsburg, W. Va., is in a position to supply parts, although it has discontinued the manufacture of cars.

4—The underslung principle has probably failed to gain because it introduces considerable difficulties in design. Furthermore, it does not actually lower the center of gravity. The heavy part of the chassis is the engine and this must be a certain distance above the ground to give proper clearance. This means that the center of the crankshaft is at a certain height and the driveshaft to the rear axle must be at the same height. It is necessary to allow certain space for spring movement, so the position of the floor of the car relative to the ground is really settled by the diameter of the flywheel. In the underslung car the frame is very low, the engine, transmission, etc., being high with respect to it and the body adapted to suit. With the ordinary car the engine and transmission stay in the same place while the frame is raised. It is easy to build an underslung car of the roadster type if the engine is well forward so that the flywheel is hidden behind a sloping foot-board and room for the rear axle to move up and down is readily obtainable below the rear deck. When the endeavor is made to work in the five-passenger body all sorts of troubles commence.

Data on Dyneto Ford System

Editor THE AUTOMOBILE:—I have a Dyneto single-unit lighting and starting generator which was on a Ford. I want to use it to charge storage batteries using an electric motor to drive it. I will have some 12-volt and 6-volt batteries to charge. This being a 12-volt system, how will I reduce it to charge 6-volt batteries? Please give wiring diagram.

2—Where can I get a cut-out and an ammeter for this?

Nocona, Texas. R. A. F.

—It is not necessary to do anything to the Dyneto generator in order to charge 6-volt batteries. A dynamo which will charge a 12-volt battery will also charge any other battery of a lower voltage. In charging stations it is customary to use 50 or 100 volts to charge 6-volt batteries.

2—You can use the starting switch as a cut-out and you can obtain a suitable ammeter from the Dyneto Electric Co., Syracuse, N. Y.

Information on Horsepower Tests

Editor THE AUTOMOBILE:—Are all engines run at the same revolutions per minute when testing for horsepower?

2—At what speed did the model 75 Overland run to test out at 15.63?

3—Can you give specifications of the new four-cylinder Buick, and rated horsepower.

Helena, Mont. L. N.

—No. The engines are run with the maximum load at wide open throttle and the number of revolutions per minute will depend on the characteristics of the individual engine.

2—The horsepower curve of the Overland model 75 was published in THE AUTOMOBILE for May 18 on page 903. This shows a brake horsepower of nearly 30 at 2100 r.p.m.

3—The four-cylinder Buick runabout, known as D-4-34, and touring car, known as D-4-35, sell at $650 and $665, respectively, f.o.b. Flint, Mich.

The motor used is of the same overhead valve construction as the present six and is 3⅜ by 4¾, developing 35 brake horsepower. Other specifications include: 106-in. wheelbase, Delco ignition, Stewart vacuum fuel feed, 31 by 4-in. non-skid tires, three-quarters floating rear axle, semi-elliptic springs on both front and rear, the front being 30 by 2 in. and the rear 48 by 2. The car has three speeds forward and is geared 4 to 1 on high. Both the runabout and the touring car are built along the lines of the six and include practically the same equipment.

Charging a 1911 North East Unit

Editor THE AUTOMOBILE:—I have a 1911 North East motor generator taken from a Michigan 40 using an eight-cell battery. We wish to use this machine to charge both 6-volt and 12-volt batteries, driving the machine with a 1-hp. gasoline engine. This machine, as a generator, delivers only 5 amp. at 20 volts, which is not large enough current for economical charging. Using the motor terminals as a series machine the amperage runs up to 15, which makes the load too heavy for the engine.

Can I use a rheostat to cut the amperage down or can the connections be changed in the generator so as to give the desired current?

2—Kindly publish this motor generator winding.

Pecos, Texas. R. E. W.

—Current regulation in this machine is obtained by means of a differential field winding, commonly known as a bucking field. Further regulation is obtained by introducing, at a predetermined speed, an external resistance in the shunt field winding.

By connecting terminals numbers 2 and 4 the starter gen-

erator will operate, in charging, as a differentially wound machine, the reverse current cut-out and the external resistance being short-circuited. By connecting the positive and negative leads respectively of the storage battery to be charged to terminals numbers 1 and 3 respectively of the starter generator, the charging rate can be regulated by varying the speed. A switch or reverse current cut-out should be in the battery circuit.

2—Fig. 1 illustrates the internal windings of this starter generator.

Testing Armature for Short Circuit

Editor THE AUTOMOBILE:—A Studebaker 35 with Splitdorf magneto runs perfectly on battery at all speeds, but will not run on magneto unless at 15 or 20 m.p.h. When the owner slows down for any purpose he must switch to the battery or the engine will die. I have had the armature out and the circuit is not open anywhere. Magnets have been recharged and everything done which should put it in good condition. I have concluded that one or more coils in the armature winding are shorted out and will produce current enough only at high speeds. If such is the case, what kind of instrument is used to test an armature for a short and where may I obtain one?

2—Please show me by sketch what points to cut in on for an ammeter on this car which uses the Wagner system.

Hickman, Ky. F. M. C.

—It is pretty difficult to diagnose a case of this kind, as there are many different conditions that could bring about the trouble spoken of.

First, the cam may be placed in reverse position, and this may be tested by rotating the armature just when it is ready to break away from the fields. This distance is about 1/16 in. At the same time the breaker must be in the advance position and the platinum points about to open. The proper distance between these points at full break is 0.031 in.

Although you state that magnets have been fully charged, it might be well to check this item over again. Inasmuch as you cannot throttle down below 15 m.p.h., it is possible there is a slight battery current passing through the armature winding. This would have a tendency to partially demagnetize the magnets.

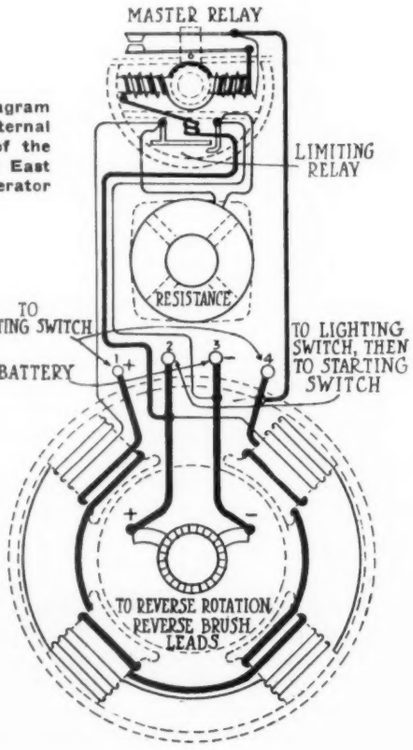


Fig. 1—Diagram of the internal windings of the 1911 North East motor-generator

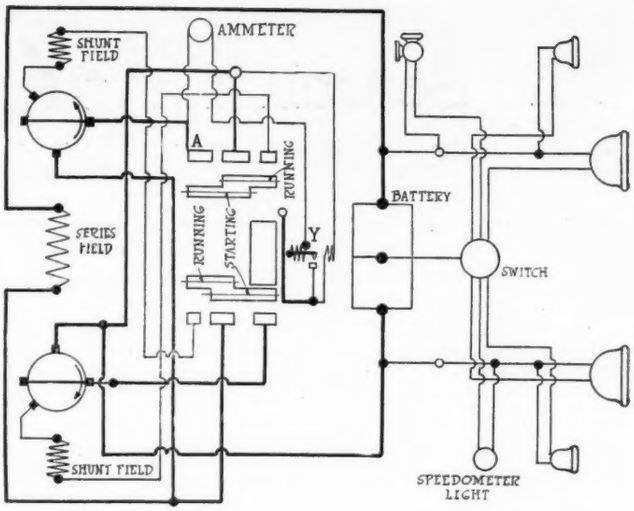


Fig. 2—Illustrating a method of installing an ammeter on the Studebaker model 35 between leads A and relay Y

One method frequently used in testing an armature for open circuit is to place a good armature in series with an ammeter and 6-volt battery. By closing the circuit, a reading can be obtained in amperes, and this would be a proper reading for an armature in satisfactory condition. Then place a defective armature in series with an ammeter and 6-volt battery and a higher reading in amperes would denote a defect in the insulation of the wiring. In other words, there would be less ohmic resistance in a defective armature than in a good one.

2—A method for installing an ammeter on this car is shown in the diagram, Fig. 2. You will note that this is placed between the leads *A* and the relay *Y*. Two long flexible cables No. 10 should be used in connecting the controller finger *A* and the relay *Y* to the ammeter on the dash.

Installing Starter on 1912 Hudson

Editor THE AUTOMOBILE:—Will it affect the operation of the Stewart vacuum gasoline system to put an air cock in the inlet manifold below the suction pipe running to the vacuum gas tank, said air cock to be operated from dashboard?

2—Kindly tell me the best way to install an electric starting and lighting system on a 1912 Hudson model 33.

3—Give names of several electric systems suitable for this car.

4—Will aluminum pistons decrease the vibration in this motor at high speed?

Lewes, Del. T. J. V.

—You might try the experiment, but unless the air cock is very small you will probably find that the vacuum tank will run dry every time you open the throttle wide.

2—The installation of the starting system on the Hudson model 33 will in no case be easy, which means that there is probably no particular system which would be especially suitable. A number of excellent inexpensive equipments are on the market and you would be best advised to apply to the best garage and repair shop in your district. They should be able to tell you the easiest system to fit from their own experience in applying equipments to other cars.

3—Answered under question 2.

4—It is doubtful whether aluminum pistons will make sufficient difference in the running of your engine for it to be worth while to make the change.

The Search for the Army Truck Wheel

(*Continued from July 13, pages 60 and 61*)

By Marius C. Krarup

USING the reference letters from Fig. 3, in the previous installment, it may now be shown that for steady running the advance of Q in Y is limited, though momentum may increase it usefully after a road shock.

If angle β is increased, l is increased but $R \sin \beta$ is also increased and the linear development of arc AC is increased. The general effect of increasing β from 45° to 60°, for example, which is near the limit where slippage of Q on Y may be feared, is ascertained by inserting the value of $\beta = 60°$ in the test formula. With S, f, R and r unchanged l becomes 1.5 inch or 0.125 foot, and $\sin 60° = \sqrt{0.75} = 0.866$. Formula then gives:

$$t = \tfrac{1}{4}\sqrt{0.125} \times \frac{1000 \times 1.25 \times 0.866 + 260}{1000 \times 1.25 \times 0.866}$$

$$= \frac{2 \times 1.66 \times \pi \times 60}{360 \times m \times 1.466} \text{ second}$$

$$t = \frac{0.353}{4} \times 1.24 = 0.10943 = \frac{1.7467}{m \times 1.466} \text{ second}$$

The time for the fall of L has been increased from 0.08675 to 0.10943 second.

$$\text{As } m = \frac{2\ S\pi\beta}{360 \times t \times 1.466} = \frac{1.7467}{0.10943 \times 1.466} = 10.89 \text{ m.p.h.}$$

the velocity of the start has only been increased from 10.28 m.p.h. to 10.89 m.p.h.; indicating that this wheel system has a considerable range above the value of 45 deg. for β where vehicle speed on level ground cannot be strongly affected by speeding the engine, but this means also, of course, that acceleration and pulling power are similarly limited for any given design of the wheel and that it is useless to employ a motive power larger than required for maintaining Q at a position making β about 60 deg.

The relation of this power requirement to the value of L can be shown to make the weight of the load a smaller consideration than for normal driving wheels, provided the wheel dimensions and road conditions are such that f is not increased by the increase of the load.

On the other hand, acceleration and pulling power may be influenced largely by varying relations in the values for S, R and r, but such variations also affect the character of the wheel design. And the need of a design giving strength, compactness and lateral stability, as well as that independence of mud, sand and surface formations which goes with having S considerably greater than R and thereby raising the track for Q above the level of road troubles, imposes some limitations on design variations.

As acceleration depends less on ample power than on the ratio of L to $f\dfrac{(L + W + L_2)}{R \sin \beta}$, the weight moved can be very large if f is small and can be in form of a trailing load, T, making the total resistance $\dfrac{f\,(L + W + L_2 + T)}{R \sin \beta}$, and the suggestion is presented if this wheel type, with its relative independence of skillful manipulation of the clutch for starting, may not be especially adapted for the wheels of internal-combustion engine locomotives operating on rails with short trains of cars, as on feeder lines of railways, the traction being independent of slippery rails except in so far as the cause of slip in some cases also causes f to be increased.

To see how a minimum value for f affects starting and the conditions for acceleration, $f = 0$ may be used in the foregoing example, with $\beta = 60°$. The time for the unrestricted fall is here $0.353 : 4 = 0.088$ second, while $2S\pi\beta : 360 = 1.7467$, and one has

$$m = \frac{1.7467}{0.088 \times 1.466} = \frac{1.7467}{0.128008} = 13.65 \text{ m.p.h.}$$

The change in the conditions for starting, as compared with the previous instance with $f = 0.20$ is not nearly as pronounced as it would be with normal wheels.

To a certain extent all these examples, and the test equation as well, represent an unreal condition, as in practice Q is brought to angle β by a gradual engagement of the clutch and has some angular speed when it gets there. Also, the vehicle begins to move as soon as the pressure of L passes beyond angle a, the angle of equilibrium with traction resistance. But the test formula furnishes a measure of the forces that influence operation without complicating the subject with inertia and acceleration.

The rate of acceleration for a perfectly uniform road condition is easily figured, but the maximum speed attainable is of course subject to many limiting factors in practice—such as tire resistance, air resistance—which it would be too difficult to introduce.

Taking it as unmistakable that the power transmitted from the engine by the rotation of Q takes effect as gravitation of load L at the point c, one has that the acceleration factor in the continuous tendency to falling, which the rotation of Q counteracts, is so much less than 32 ft. per second as $f\dfrac{(L + W + L_2)}{R \sin \beta}$ is smaller than L.

giving $g_1 = 32\left(1 - \dfrac{f\,(L + W + L_2)}{L.\,R \sin \beta}\right)$

In the example, this makes $g_1 = 22.72$ ft. per second. But some difficulties are encountered in perceiving exactly how any value for g_1 can be applied to the vehicle speed, so long as it seems evident that acceleration must result in a gradual increase of β until power and resistance reach equilibrium and speed becomes uniform, and it may be sufficient here to note that the limits for acceleration seem to be determined by the power, if this is scant, but by the highest practicable value for β if the power is sufficient for making Q advance to the maximum angle, the load and the traction resistance considered.

The power required for moving $f\,(L + W + L_2)$ at the rate of $m \times 1.466$ ft. per second is

$$f\,(L + W + L_2).\ \frac{m \times 1.466}{550} \text{ horsepower.}$$

since 1 hp. raises 550 lb. 1 ft. per second.

And, with the values for the traction resistance factors used in the examples and a vehicle speed of 10 m.p.h. ($m = 10$), this gives one expression for the required power P,

$$P = 260 \times 10 \times 1.466 : 550 = 6.93 \text{ hp.}$$

It should be possible to figure the movement of Q representing the same horsepower and probably another formula representing the limitations of the system for application of power, giving the maximum as a function of load and other factors with a certain maximum β assumed. But so far the effort made for producing such a formula has run into complications, mostly due to uncertainty in grasping the exact mechanical nature of the work done by Q. Without attempting a formula, it seems plain enough that natural acceleration will permit considerable road speed if the engine power is sufficient to produce a large β, and that even a small β will produce vehicle movement under circumstances

which would require an exceedingly low gear with normal wheels as well as perfect adhesion in the road contact.

Rough roads, upgrades, downgrades, braking, slippery roads and interchangeability with normal wheels are factors which were mentioned before as representing other conditions which the composite wheel should meet if it is to be considered.

Little need be said about the effect of roughness of the road surface, as practical tests only will satisfy. While the composite wheel has more adaptation to roughness than the normal wheel and must tone down the horizontal component of shocks, it must also re-adapt itself to the running after a shock, and the total effect is not easily realized mentally. As in the case of normal wheels, road obstacles of considerable size and rising sharply from the surface can only be overcome readily by momentum. But the retardation in such cases will mainly affect the component Y, while the vehicle continues going forward and is liable to bring β momentarily to almost 90 deg., whereafter Y, with its small weight, probably will be readily turned over and carried along without any injurious impacts, provided the central device in the wheel (see Fig. 1) maintains steady contact between the two components.

The Action on Grades

The efficiency on upgrades is the worst operative feature in the wheel if speed is the requirement, because the grade reduces the leverage with which the gravitation of the load can operate to overcome traction resistance. But ability to get up, if only at a crawl and even if the grade is slippery, is the compensating advantage. If DA, Fig. 4, represents a grade of γ degrees, the maximum operating angle is reduced from β to $\beta - \gamma$, and the leverage is reduced from $R \sin \beta$ to $R \sin \beta - S \sin \gamma$.

On steep grades f is fortunately as a rule low, because sand of the kind producing a 20 per cent f does not stay on hills and moisture also is drained off. If the angle γ means a 15 per cent rise and the traction coefficient proper is 5 per cent, the f with which the total traction resistance on the hill must be figured, becomes 0.20, as in the examples relating to traction on the level, but the reduced leverage must make progress slower. In the tractors with propulsion of this type, which have been used for work of still more refractory nature, the special disadvantages on steep hills were overcome by making S little larger than R and r considerably smaller, but the result of this choice of dimensions was not a wheel but a special tractor-truck construction. As the system permits some rate of progress under conditions which stall ordinary motor vehicles, however, even if the proportions are consistent with the preservation of the mechanism as a wheel which can take the place of a normal wheel, and as conditions absolutely requiring different proportions to make sure of effecting progress are rare, there still seems to be room for experiments with the composite wheel type to arrive at dimensions and proportions suitable for those forms of military or civilian transportation work in which certainty of pulling through is more important than rapid acceleration and speed on hills, and for other work, such as quarry and excavating work or hauling of stone, gravel, sand, in which it may be an economical advantage to be able to use a small motive power and yet be sure of getting the work done. Immunity to slip where other wheels fail and the chance of perfecting a construction which by adjustment may be turned into either a wheel functioning normally or a composite wheel, naturally constitute weighty considerations in the same connection. The same may be said of the suitability of the type for traveling at good speed on fair roads.

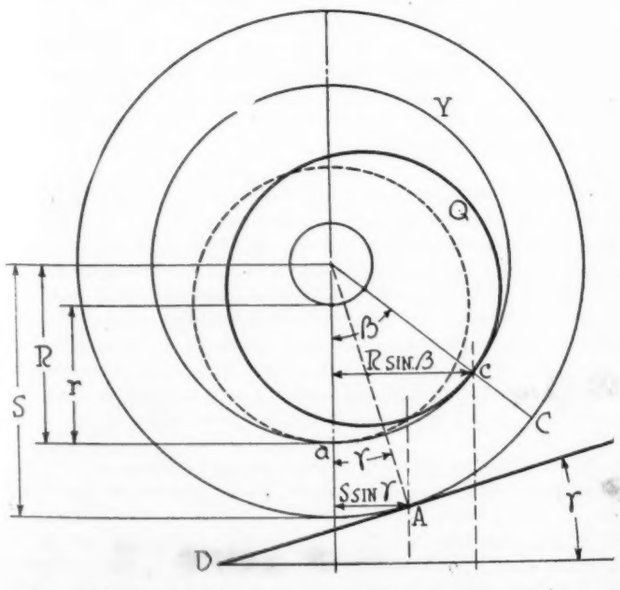


Fig. 4—Diagram of main factors coming into play with driving wheels of the composite type on road grades

Fig. 4 may be looked upon as representing downgrade travel as well as upgrade, by reversing the supposed direction of travel, and if any difficulties can arise which are not the same as those occurring in uphill work and due to the shortened leverage with which the power operates, they must be traced to the possibility of the vehicle running away from control by the power and the brakes. As the brakes operate on Q, to which the brake drum is secured, and Q runs on a guaranteed friction surface in Y—its tracks—and as it is of smaller diameter than a normal wheel and can be blocked more securely by brake action, if necessary, the chance of Y carrying Q beyond its slipping angle can scarcely be perceived as actual.

If the vehicle is to be held at rest on a grade, Q will naturally be brought to its lowest position in Y, but Y will at all events be prevented from rotating more than a few degrees if Q is held, and in starting uphill after the stop the conditions are not materially different from starting on the level, except that Q must advance to a larger angle before vehicle movement begins. In this respect the advantage seems to lie with the composite wheel type, and in the applications for which it is suited it might furnish the opportunity for doing away with one of the two sets of brakes now usually employed, since one set can readily be made to act as service brake and emergency brake combined. If it were to be expected that trouble with the system might arise through very careless operation—as when allowing the vehicle to run wild downhill—a dragbrake could conceivably be developed which would furnish the needed security and would be unexceptionable for the class of vehicle for which it could be wanted.

In considering the possibility of Y slipping on a road which would cause slipping of normal driving wheels, the fact that the power is not applied at the road contact, but continuously tips Y around the point of road contact as a fulcrum, seems decisive. Slipping of wheels is indeed inconceivable so long as the frictional contact of Q with Y is intact, as any actual slip would bring Q in advance of the point of ground support, if it were not there before, and gravitation would thereafter necessarily take effect to turn Y and move the vehicle forward. Only if $(S - R)$ were extremely small and Y a substance having no mass could it be conceived that Q in its rest position, contacting with Y immediately above its point of ground contact, could by its own rotation impart a stationary rotation to Y without changing its relation to Q. Even this remote possibility—with which reality has no better parallel than the immersion of part of the wheel in a greasy hole offering practically no friction to hinder the rotation of Y—is rendered remoter still when S is appreciably larger than R, so that Q's point of contact with Y when at

rest lies some distance above the point of ground contact of Y. On the whole, however, and with dismissal of far-fetched objections, the security against wheel slip lies practically in the impossibility of having any abnormal resistance to the first advance movement of Q in relation to Y, whereafter gravitation must take effect imparting a rolling movement against which a slippery road is harmless.

With slip and spinning of wheels impossible, skidding becomes improbable, as generally understood. And, with the frictional contact of Q with its track safeguarded by the materials used and by its elevation above the road level, the ordinary differential gear is made to operate properly without fail.

These properties of the composite wheel are apparently raised above reasonable doubt more securely than any other merits that might be claimed for it.

Interchangeability with Normal Wheels

When Q makes 1 revolution Y turns r revolutions divided by R, and to make the same vehicle speed as a normal wheel with the same height of axle by rotating Q with the same angular speed as the normal wheel, the radius S of Y in the composite wheel must be in the same proportion larger than R as R is larger than r, and $S - R + r$, being the height of the axle, must be equal to the radius of the normal wheel. These proportions are easily materialized if the eccentricity of the wheel components can be made large—as by having $r = 12\frac{1}{2}$ in., $R = 16\frac{3}{4}$ in. and $S = 22\frac{1}{4}$ in., to replace normal wheel of 36 in. diameter—but will make Y stand $8\frac{1}{2}$ in. higher than the normal wheel, necessitating a change in mud guards, if any are used. Better results might be obtained by allowing the composite wheel to raise the total gear ratio of the vehicle somewhat, since the higher torque of the lower gear can probably not be utilized anyway. But with the dimensions just referred to, or other ones in the same proportion, the composite driving wheel can built without departing from the general lay-out of construction features indicated in Figs. 1 and 2.

In order to make it practicable to transform a composite wheel into one operating on the normal plan—by incorporating an expanding element in Q by which it could be raised to concentricity with Y and braced against its tracks—a smaller eccentricity than that indicated in the dimensions referred to would of course be desirable. Probably nothing but experimenting can furnish the best compromise solution in the matter of dimensions.

To advance consideration of the type to a practical stage there are still lacking satisfactory formulas for (1) vehicle acceleration, for (2) the relation of β to vehicle speed and for (3) the maximum applicable power as a function of the load. To their production the writer will shortly devote as many hours as may be required for making the conclusions final.

Paragraphs on Current Topics

By Marius C. Krarup

Motto: Radical Thought, Conservative Action

News from the motor cars and trucks "somewhere in Mexico" may not be what the general public is yearning for most impatiently, but it is sadly amusing to reflect that it is delayed and mystified principally because the Japanese found concealment of military movements a good policy in the Manchurian campaign of 1905 and reduced the pristine war correspondent to a transmitter of rear guard small talk. The Balkan powers copied this innovation and enjoyed the resulting freedom for atrocities. And now, in Europe as in Mexico, although reconnoitering by aeroplane and transmission by wireless render the precaution futile—each belligerent knowing full-well and all the time what the enemy is doing at his front and 100 miles behind it—the precious phrase "somewhere in ——" has come to signify patient acquiescence in a secret-mongering method the justification for which has ceased to exist. Perhaps we should ask the Japanese how they would proceed now, when secrecy is effective only against friends at home, to turn the broadest kind of publicity to good account for war purposes.

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Between 11 and 12 o'clock last Friday night the sun threw on a screen right before the eyes of all New York and before millions of Americans in other States a stupendous moving shadow show of the war in Europe. And it was a show of the war operations of the following morning at dawn. Yet no poet has sung about it, and the newspapers called it an eclipse of the moon. Yes, the moon was the screen, and over it was moving in sharp contours the shadow of that edge of the earth where the sun was rising over renewed Russian assaults upon the German lines—those of Saturday morning, which were reported by cable 24 hours later. Thousands of American motor trucks with ammunition were lined up at the rear. Some of them were moving forward when caught by the horizontal rays of the star of day and projected in black against the luminous disk which we were intently observing. An aeroplane arose. A huge shell exploded. Pandemonium reigned. All became blurred. The shadows shuddered. Then quiet; the dawn had reached Poland where there is a solitude that they call peace. But no, the edge of daybreak runs northwesterly, and further South, in Bukowina, we suddenly see the outlines of Cossacks with their lances charging furiously over the crest of the hill. The show moved fast. Even war does not stop the earth's rotation or delay it a second. Somewhere the shadow passed over Wilhelm and his sheltered sons. Nothing was projected. They slept. There was an intermission of a half hour. The cosmic operator of the light was sweeping his tell-tale rays over the domains of the central powers where nothing stirred against the illuminated horizon. At last they passed into France. A glimpse of Verdun at sunrise. Only thousands of little black dots—a curtain of artillery fire—were leaping over the screen close to the edge of the earth's shadow. Then it was past 12 o'clock. The show was over. The rest of it missed the background until then providentially supplied and vanished into the universe.

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Only the lack of mechanical facilities for magnifying the optical dimensions of this wonderful spectacle, this marvelous feat in instantaneous news reporting, kept the public at large from witnessing it. Some day civilization will be prepared for such opportunities, but we think it a duty to record now exactly what so many might have seen with their own eyes. And incidentally we come to think of the many other excellent photographic illustrations of important realities which miss their usefulness entirely because they are printed too small—in our esteemed contemporaries, of course.

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If the Service Station is a permanent adjunct of the big manufacturer's sales department, an incubator for good will and repeat orders, and if it pays for itself in the large cities and aggregations, what is to be the means by which its benefits may be extended to minor towns and to the customers of smaller manufacturers? It is a unique institution with no parallel in any other industry; a distinct invention to

meet a want. So long as repairmen in general may not be confidently relied upon to handle each and every make of car or truck with full understanding of its peculiarities, with the assistance of ready access to spare part supplies and with a desire to do justice to the construction and the customer, the specialization of skill and facilities found at the service station must remain a great mutual advantage for maker and user. And it has found another mission in teaching maintenance methods for commercial motor vehicle installations. Nothing short of a comprehensive organization of repairmen, ready to co-operate with manufacturers in severalty, seems to be in sight for extending these benefits where they are now not enjoyed. As an introductory step perhaps the manufacturer's book of instructions for his customers could be edited more directly for the benefit of the repairman than it usually is.

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The exalted motive which keeps people from committing faulty mathematics occasionally may be respect for the science or it may be fear of being found out and declared a dunce, since mathematics and mathematical physics have a way of tracing the transgressor without leaving a loophole for escape. But this most stringent and conclusive form of reasoning will never be very popular and useful so long as it is held sacrosanct. Something that nobody dares to blunder in is not going to be practised extensively, and without frequent practice what is to become of the meager skill with which the graduate starts in his profession? Integration, a most useful mental process, is almost tabooed in discussions, killed by an overdose of reverence. If we could learn to laugh and joke in algebra, calculus would soon become a chummy companion of common thought. Even analytical geometry might begin to talk with human voice, showing its curves through the mask of its equations, and it might become a real sport to work out its secrets with arbitrary asymptotes suitable for a practical occasion—as might be very useful in designing mills for cutting gears or cams of special shapes. But first we must have many errors and many to point them out.

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According to a volunteer statistician 3217 women drove motor cars for pay in England a few months ago, and their number was increasing fast. As soon as cured of affectations of timidity they drive as well as men, it is said, but not quite so fast. That they should ever give up this occupation seems improbable. And similar reports come from Berlin. In a few years the example must take effect here. But the prospect has no problems. Everybody can apparently afford to await its natural development without impatience.

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The demonstrator salesman pulled his car up short near 14th and Broadway and his eyes swept over the swarm of motley humanity, mostly in stockings, that was hustling home to the tenements from the daily work. "Look at them," said he triumphantly to his prospect; "nearly every one of them will be taken 'as is' by somebody, to be supported for its natural life, and think of the upkeep. That's easy instalments for you. That's what it does. Anything goes on that plan. You don't have to make things right if you are going in for easy payments, and you don't, of course." The prospect very quietly said something about modern manufacture certainly being ahead of nature in the uniformity of the product, and the demonstrator took it for consent.

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Ethical, reformed advertising represents one of the latest patriarchal movements for the public's protection and the purely moral satisfaction of the protectors. A fine movement, for a change; for those who need the change. But the art of truth-telling is remarkably difficult. While "yielding to no one in veneration of veracity," one may yet have misgivings. A good advertisement is brief and the whole truth is long. Must the little doubts which are to result in next year's improvements be handed over by the concientious principal to the expert writer of advertising matter with injunction to cry about them from the housetops? Discrimination between facts which the public can understand and those which the majority would misunderstand raises a nice issue in casuistry and a problem in competence. Many among the public prefer the mental exercise of picking the winner in a spirited contest in plausibility, rather than surrendering their critical acumen and accepting instead a blind faith in the conversion of those advertisers who make it a point to subscribe to the purified creed. And a trusting public would delay progress. The longing for the near-millenium is also assuaged by reflecting on the enormous profits which No. 100 could garner by sophisticating skillfully now and them, if his 99 competitors had schooled themselves to a more complete frankness than the average individual is able to practice within his own mind. The agitation of the subject may be timely, but a guardianship for the public would be the saddest of all things, a serious burlesque.

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In the age of mergers and economies, both true and false, the theoretical publicist who has not grasped the force of specialization expects co-operative advertising will be more and more employed. What is it? We offer a sample (illustration omitted):

The modern Omar and his Thou pull up under that tree in a comfortable little 1917 *Arethusa* car,
Draw from the dainty *Beowulf* lunch basket with ice compartment ($5.22 at *Christopher's*)
A box of the celebrated *Dania kiks de seigle* (all grocers),
A gastronomic confection of stuffed dates from *Erk & Filford,*
And a *Thermos* bottle filled with delicious decanted *Chambertin* (Type) from *Gamache.*
Leisurely they nest their feet on the cushioned *strapontin-en-banc, Hustler's* patent.
And why shouldn't they be able to feel pretty cozy, especially as that book of verse is
The latest best seller, the *Ideocrat's Jodlings,* ($1.50) in *vers libre;*
That marvelous form of speech which is relieved alike of prosaic and poetic restriction?

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In the midst of war's horrors, reports *American Motorist* from the trenches, the high-spirited *poilu* has invented the word *tacot* to designate an automobile that is below par. Too late! *Tacot* antedates "ice-wagon" in the international dictionary of slang. The word grew whiskers, so to say, before the *poilu.*

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Let no tradesman be deceived if he hears that shark-absorbers are in great demand at New York and New Jersey seaside resorts.

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Be a gangster! Modern life is complex and subdivided. Its human unit is no longer the individual but the gang, a gang controlling a full assortment of abilities. Success and satisfaction are measured by capacity for association with others who supplement you. The commonest mistake is not loneness, but choosing for associates those who duplicate you. That does not make a gang but a mob. Don't be a mobster!

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This is in brief The Boundless Gangster Philosophy with regard to which we have been honored with an inquiry.

The Automobile

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Production

NO better proof could ever be asked of the quality of American passenger cars than the fact that although in 1916 we have only 99 factories as compared to 270 in 1911, yet the production for the first half of 1916 is 754,902 as compared to only 200,000 for the entire year of 1911. In other words, four times the number of cars have been made by one-third the number of plants in half the time.

What was good has survived and been improved upon, and yet the cars of to-day are 35 per cent less in price than they were 5 years ago. Better methods, better machinery, better factories and the more economic handling of labor have been the reasons for the combined facts of greater production and lower-priced cars. In some factories the overhead per car has been cut 200 per cent and more in 2 years. In others double the production has been secured from the same number of men.

Greater production has demanded higher efficiency in other departments. It has meant the creation of a bigger market with the ever-present demand of lower cost per car in selling. Less unit-cost is the story of the entire automobile business. It means less per car to make, less per car to sell and less per car to purchase, and the saving in each of these three fundamental departments has been reaped by the consumer who pays one-third less for his car now than he did 5 years ago.

Selling as a Science

THE World's Salesmanship Congress held last week in Detroit accomplished much if it did nothing more than impress on those salesmen present the deplorable lack of facilities for the preliminary training of salesmen. The congress has done more in that it has made a start towards placing salesmanship in the ranks of sciences, where it rightly belongs.

The young man who aspires to be a doctor or surgeon has within his reach medical schools in which he can take a complete course in medicine or surgery so that when he starts practice he is scientifically prepared for the work. He is a graduated physician.

So with the profession of law, those who aspire to its ranks have schools for preparing themselves, and who would think of beginning the practice of law without first having absorbed the known principles of the law.

In engineering circles the same rule applies, our leading engineers are schooled in the sciences at our universities before they attempt the work of design and construction, a knowledge of fundamentals of engineering principles being essential for any person attempting to succeed in the engineering field.

But turn now to salesmanship, that great essential of this ultra-commercial age, and we are lacking in those great institutions for the scientific education of the salesman. Too many of our salesmen start into their profession as laws unto themselves, without previous education in the essentials of the profession, and perhaps without definite knowledge of the fundamentals of salesmanship. The large manufacturers or industrial houses do not care to place the sale of their commodity in such hands. The Salesmanship Congress has recommended in favor of such educational work and such a movement deserves the united co-operation of the automobile industry.

Recognition

AFTER all the valuable work of standardization accomplished by the Society of Automobile Engineers it is no surprise that the army and navy should look to the society to carry out the aircraft standardization which is so urgently needed. None the less, the holding of an S. A. E. meeting in the Bureau of Standards at Washington, the home of national standardization, unquestionably marks a stage in the development of the society, and will cause July 18, 1916, to be a memorable day to all those who have been leaders in the S. A. E. since its inception.

When the government authorities found the vital need for standards of dimension in aeroplanes the S. A. E. appealed to them as being the natural and proper body to carry out the work. Aided by the accumulated experience of automobile standards, supported and assisted by the army, navy and Bureau of Standards, the new aeronautic division of the S. A. E. committee ought to find that very rapid progress is easy.

S. A. Wants American Cars

Beecroft, After 10-Weeks' Trip as U. S. Delegate, Reports Big Field

NEW YORK CITY, July 18—David Beecroft, directing editor of THE AUTOMOBILE, has returned from a 10-weeks' trip to South America, where he went as a delegate of the United States Government to investigate trade conditions in Argentina with special regard to the automobile industry in that country. Mr. Beecroft was a member of the Argentine Return Visit Committee, the visit following a similar one made by delegates from the various countries in South America in 1915 as representatives of their respective governments.

While in South America Mr. Beecroft traveled extensively through Argentina, and also Uruguay and Southern Brazil, and reports that the U. S. A. automobile has been meeting with greater success in these countries during the past 18 months than ever before in its history. The sale of expensive European cars has practically been at a standstill for 3 and nearly 4 years, but the American car has demonstrated that it can stand up in the country districts where roads are not to be compared with those in this country, and as a result there is a great demand among dealers in all three countries for agencies of lower-priced American machines.

An exhaustive series of articles on the automobile, automobile accessory, motor truck and motor tractor situation in these South American countries will follow from week to week in THE AUTOMOBILE. This will be the first opportunity the automobile reading public of the United States will have had of so extensive a series of articles dealing with all the problems directly connected with the automobile industry as existing since the opening of the European war. The first of these articles will appear next week.

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Neville Co. Absorbs More-Room Steering Wheel Co.

DETROIT, MICH., July 14—The Neville Steering Wheel & Mfg. Co., this city, has absorbed the Neville More-Room Steering Wheel Co. F. A. Vollbrecht, formerly general manager of the King Motor Car Co., is president of the new corporation, John V. Harding is vice-president and A. W. Webber secretary and treasurer. Harding is known in the trade through his 6½ years' work as special factory representative of the Motz Tire & Rubber Co., and later the Goodyear Tire & Rubber Co., in Detroit and the country at large. Webber was formerly of the General Motors Co. The new company has obtained fireproof quarters at 74 Congress Street West, Detroit, where it is now devoting its energies exclusively to manufacturing a full line of Neville More-Room steering wheels. William Langton has been appointed factory superintendent, and the factory is now producing its wheel in quantities to take care of both manufacturers and the jobbing trade.

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Aland 16-Valve Four Coming

DETROIT, MICH., July 17—Organization plans are under way for the Aland Motor Car Co. of this city. According to R. C. Aland, chief engineer, the company is about to incorporate for $500,000 and plans to produce, starting in December, a lightweight car fitted with a four-cylinder sixteen-valve power plant.

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Allen Offers New Model at $850

FOSTORIA, OHIO, July 17—The Allen Motor Co., this city, has announced a specially finished car to be sold at $850 f.o.b. Fostoria. This new car will be known as the Allen Classic with the standard Allen chassis and body, finished in brown with gold striping, black fenders and radiator. The upholstery is Spanish brown in color. The offering of this new model will in no way interfere with the production of the Allen 37.

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Cars to Go on Tracks

MILL VALLEY, CAL., July 17—H. S. Johnson, a mechanical engineer at present with the Mt. Tamalpais & Muir Woods Railway, is forming a company to manufacture gasoline automobiles to operate on railroad tracks.

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Armored Cars to Have King Chassis

DETROIT, MICH., July 17—The Armored Motor Car Co. has been formed to manufacture armored automobile bodies. The principals are at present in Washington, D. C., and plan to stage, soon, a test for the inspection of the government. The company plans to use King chassis.

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Levy Takes Marion-Handley

CHICAGO, ILL., July 18—James Levy, the former Chalmers dealer in this city, has taken over the Marion-Handley car. The James Levy Motors Co., the name of the new company, will be located at Twenty-third Street and Michigan Avenue.

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Bowler Is H. A. L. Sales Manager

CLEVELAND, OHIO, July 17—George H. Bowler has been appointed sales and advertising manager of the H. A. Lozier Co., this city, to market a new H. A. L. twelve.

Crew-Levick Co. Sold to Syndicate

New Yorkers Buy Out $5,000,000 Manufacturers of Perfection Oils, Etc.

PHILADELPHIA, PA., July 18—The Crew-Levick Co., one of the oldest major refiners and distributers of petroleum products, with refineries at Chester and producing properties at Titusville and Warren in this State, has sold out to a New York syndicate. The Crew-Levick Co. is chiefly known to the automobile trade as the manufacturer of Perfection oils and greases and recently has added a number of other petroleum products to its line, including grease tubes for quick filling of grease cups, Mistokleen, a body cleaner, as well as other products.

The company is capitalized at $5,000,000 and the sale price is approximately $125 per share. It was first rumored that the purchaser was allied with the Standard Oil Co., but this is denied by Crew-Levick.

—

Reliance Engineering Acquires Hercules Forge Co.

LANSING, MICH., July 8—The Reliance Enginering Co. has purchased the Hercules Forge Co., Indianapolis, Ind., the deal having just been closed. The Indianapolis concern sells equipment only and no real estate nor shop buildings were included in the sale. All equipment will be moved to this city and installed in the building formerly occupied by the foundry of the Seager Engine Co., which company has been taken over by the Reliance company. This building will be equipped for drop forging exclusively and the Hercules company equipment is for general extension of the Reliance engineering department.

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Eubanks Resigns from Barley

STREATOR, ILL., July 13—It has been announced that P. J. Eubanks, sales and advertising manager of the Barley Mfg. Co., of Streator, has tendered his resignation, to become effective Aug. 1.

While no announcement has been made relative to Mr. Eubanks' future plans, it is believed that he will take a protracted vacation and much needed rest before again taking up active work.

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Humphrey Joins Briscoe

JACKSON, MICH., July 14—S. H. Humphrey, formerly vice-president of the Chalmers Motor Car Co., has been elected vice-president and manufacturing manager of the Briscoe Motor Corp., this city.

Mr. Humphrey has been connected

with the automobile industry since its inception, starting as a mechanic at the Peerless factory in Cleveland. His first connection with the Briscoe Brothers was in 1908, when he went to the Brush company as works manager. For several years he was manufacturing manager of the Hupp Motor Car Co., leaving that company to become vice-president of the Chalmers.

—

Drexel Succeeds Farmack

CHICAGO, ILL., July 17—The Drexel Motor Car Corp. has succeeded the Farmack Motor Car Corp., and is issuing stock at $10 per share. It is capitalized at $2,000,000.

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Gillett Buys Out Wilmo

CHICAGO, ILL., July 17—The Wilmo company, manufacturer of accessories, has sold its property, patent rights and good will to the Gillette Motors Co., Mishawaka, Ind. King C. Gillette is president.

—

G. H. Smith Mercer Sales Manager

TRENTON, N. J., July 13—G. H. Smith has been appointed sales manager of the Mercer Automobile Co., this city.

Mr. Smith has long been known in automobile trade circles, having been with the White and Peerless companies.

52 Saxons in 3000-Mile Relay

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Sixes To Try for Transcontinental Speed Record—Will Carry Messages

DETROIT, MICH., July 16—Fifty-two Saxon six cars will relay from New York to San Francisco, by way of demonstrating what can be done with an automobile as the bearer of messages over long distances. They will race at top speed for stretches of about 75 miles each.

Starting Saturday morning from New York City, a Saxon car will enter the Lincoln highway, which leads from coast to coast, and will travel the first lap of the journey. A message from Mayor Mitchel of New York to Mayor Rolf of San Francisco will be handed the driver just before the start, which will be passed along the line and eventually delivered at the city of the Golden Gate.

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Hood and Botterill Open Offices in Detroit

DETROIT, MICH., July 17—A new wrinkle as regards having permanent representation in Detroit so as to insure prompt shipment of cars, materials, accessories and other supplies has been worked out by at least two parties, one being Tom Botterill, distributer of Hudson cars for Utah and Colorado, with headquarters at Salt Lake City and Denver, and the other is the recently formed Wallace C. Hood Service Bureau. Mr. Hood was formerly connected with the Chalmers, Everitt and Empire companies.

The former differs from the latter mainly in the fact that Botterill's establishment of a Detroit office with A. S. Broadhead in charge, was done to seek closer touch with the Hudson factory only, while the Wallace C. Hood bureau is organized to help any manufacturer, jobber or distributer, acting as his representative in securing prompt shipments, following orders through production at any factory, and in fact assisting automobile manufacturers or distributers who have been working at a disadvantage through lack of representation in Detroit and Michigan.

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Grossman Holds Sales Conference

BROOKLYN, N. Y., July 17—The annual sales conference of the Emil Grossman Mfg. Co., Inc., this city, took place July 14 and 15. The first conference opened at the executive offices of the company in Bush Terminal Building No. 20 on July 14 and adjourned for the second conference on July 15 at the Brighton Beach Hotel, Brighton Beach, L. I. Policies for 1917 were formulated at this

Big Dealers' Upheaval in New York

(*Continued from page* 85)

1826 and 1828 Broadway, in which are now being exhibited Overland and Willys-Knight cars, and also the establishment and equipment of a service station at 150th Street and Gerard Avenue, the Bronx, in a building of 60,000 ft. floorspace. It is the intention of the company to open immediately sales and service stations in Brooklyn and Newark.

The new building which is in process of completion is located on Fifty-seventh and Fifty-eighth Streets, between Tenth and Eleventh Avenues. This building is partially completed at the present time and when finished will have a floorspace of 300,000 sq. ft. and will represent an investment of about $1,000,000.

E. B. Jackson, formerly president of the Packard Motor Car Co. of New York, has become associated with the Willys-Overland company of Toledo in an executive capacity. He will make use of his experience and knowledge of metropolitan needs by devoting a large part of his time to the creation and development of an organization in this territory.

In reference to E. B. Jackson going over to the Overland organization, the Packard company in this city and Philadelphia have appointed new heads of these branches. E. S. Hare, recently appointed manager of sales of the New York Packard branch, and formerly vice-president of the Commercial Truck Co., Philadelphia, now becomes general manager of the Packard branch in New York City and L. J. Eastman becomes general manager of the Philadelphia Packard branch.

The territory which Mr. Silver will have is approximately the same as that which he has had during the last 6 years, taking in all New York City, Long Island, Staten Island, most of New Jersey and a part of Connecticut, with a branch in Bridgeport. He will also take care of the Atlantic seaboard on Chalmers parts.

C. T. Silver, Inc., as the new company will from now on be known, will handle 10 per cent of the Chalmers output, dating from Aug. 1, for the coming year. Business in Peerless, Chalmers, Overland and Willys-Knight cars is now going on in Silver's salesrooms. The last two will be on the floors until all sold, though the new Overland branch will probably take them over. The Silver organization has taken over the new Chalmers cars in stock at the former New York branch and a sale is being held on the second-hand machines.

Mr. Silver began his automobile career about 7 years ago, being first associated with the Koehler company in the sale of Buick cars in Manhattan. Then he went to the Buick branch in Brooklyn. Later he established an Overland agency in that city, after which one was established in New York City at Broadway and Forty-ninth Street. In 1914 he acquired possession of the Peerless Building, where he greatly enlarged his business with the Overland, Willys-Knight and Peerless.

The formation of the new Mitchell Motors Co. of New York is in keeping with the general Mitchell policy of expansion, the company planning to build 25,000 cars for 1917. Nearly 2000 Mitchell cars were sold in the metropolitan territory last year and it is hoped to double or treble this output next year. The new Mitchell Motors Co. of New York will have the entire metropolitan territory consisting of New York City, Brooklyn, Long Island, Staten Island, Westchester and Fairfield counties, including Bridgeport and three counties in New Jersey.

comparatively early date in order that the catalog and information for jobbers' catalogs may be placed in the hands of the jobbers by Oct. 1.

The conference was attended by Emil Grossman, president, who presided, Jos. N. Lowe, vice-president and Western representative; Lewis M. Crittsinger, vice-president and factory manager; Lewis M. Schwartz, secretary, who also acted as secretary of the meetings; Harry G. Wedler, Southern and Southwestern representative; W. M. Farans, Eastern representative; A. E. Rosenberg, Middle Western representative; M. S. Rosen, factory representative; Rudolph Cony, Chicago branch manager; F. B. Conner, purchasing agent, and Chas. Rottner, New York representative. A dinner followed the final conference.

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Colt Is Cole Eastern Manager

NEW YORK CITY, July 17—W. L. Colt has been appointed eastern district sales manager of the Cole Motor Car Co. Mr. Colt will still retain the presidency of the Colt-Stratton Co., sole distributor in this territory. Capt. Harry Stratton will assume the duties of general manager.

Detail Improvements in Velie

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Will Use Timken Axles—New Bodies in Seven Styles

MOLINE, ILL., July 15.—As far as the chassis is concerned the Velie "Biltwell" sixes for 1917, made by the Velie Motor Vehicle Co., this city, have undergone little alteration. Perhaps the most prominent mechanical alteration is the use of Timken axle equipment, though sundry little details have been improved, tending to enhance the value of the cars.

In the body line a good deal has been undertaken and one of the most striking of the new models is the four passenger roadster which is quite novel, having a sweeping side line running down to the rear deck. Internally there is all the accommodation of a four-passenger clover leaf of ample proportions and plenty of baggage space in the deck. This roadster sells for $1,085 as does the five-passenger touring body, which is also quite new, being both longer and wider than that fitted to the 1916 chassis. There is a two-seated roadster at $1,065, with a large amount of space for stowing baggage and a four-passenger coupé for $1,750. For special orders a range of other inclosed bodies is made, including a very neat little town job on distinctly French lines for $2,200, a touring sedan for $1,685 and a cabriolet roadster at $1,485. The manufacturers state that all these bodies are built very substantially and are upholstered in regular Velie style with the best quality of materials. All the bodies enumerated above fit the smaller chassis of 115-in. wheelbase. There is also a seven-passenger job on a larger chassis, this having a larger engine and a wheelbase of 124 in.

On both chassis the engines used are of Continental make, and both are sixes, the smaller 3¼ by 4½ in. and the larger 3½ by 5½ in. A taper frame is used.

Dry disk clutches are fitted to both cars, but the larger has a four-speed transmission while the smaller has three speeds only. The tubular driveshaft has a universal at each end, the long three-quarter springs taking both torque and drive.

Detroit Congress Plans Greater Sales Efficiency

(*Continued from page* 87)

on the Ethics of Salesmanship by the nation's leading executives. Monday morning, July 10, the formal opening in Arcadia Hall was addressed by President Woodrow Wilson; also by Secretary of Commerce William C. Redfield and Arthur Brisbane.

Monday afternoon there were further addresses on sales topics; Tuesday morning and afternoon general sales sessions were held in the Board of Commerce Building, which organization assisted in staging the convention.

Wednesday morning and afternoon departmental sessions were held in Hotels Statler and Pontchartrain, and that evening the visitors went for a boat ride on Lake St. Claire.

This morning the final session and the completion of the organization work was effected in the Majestic Theater and this afternoon the convention held a salesmanship circus at Bois Blanc, going by special boat.

Better trained sales managers were recognized as one of the industry's needs, in order that these men may become capable teachers of the salesmen under them.

Great applause followed every reference to a merchant marine, which was mentioned by President Wilson and Secretary Redfield. President C. Louis Allen of the Pyrene Mfg. Co., New York, struck a popular chord when he said the lack of popular support for a merchant marine was in part due to the failure of the ordinary man to appreciate what was meant. He said that the legislators and business men have been talking in the wrong language. "Everybody understands what is meant by freight car shortage," he said, "why not talk to them about 'ship shortage.' Then they'll know what is meant and will appreciate the value of a merchant marine."

Mr. Allen said the salesmen of the United States could become a power for the Government if their aid was enlisted in support of any desired propaganda such as that for a merchant marine. There are said to be more than 1,000,000 salesmen in this country.

Raising the standard of Sales Bulletins and making them of more practical value was advocated by V. L. Price, vice-president of the National Candy Co., St. Louis.

"Choosing men" was discussed by several speakers and a clinic at the Hotel Statler revealed the value of psychology in rating applicants for positions.

Among the industrial problems discussed were: "Selling Schools," Edward A. Woods, president, National Association of Life Underwriters, Pittsburgh; "Integrity," Frank Goeway Jones, Detroit; "Direction of Salesmen," M. B. Nelson, sales manager, Long Bell Lumber Co., Kansas City, Mo.; "Influence of Salesmen on Product," R. B. Goodman, Goodman Lumber Co., Goodman, Wis.; "Selling Schools for Manufacturers, R. H. Grant, sales manager, Domestic Engineering Co., Dayton, Ohio.; "Price Maintenance," George E. Watson, secretary, Southern Cypress Mfgr.'s Asso., New Orleans; "The Quota," F. H. Dodge, sales manager, Burroughs Adding Machine Co., Detroit; "Contests," Blaine S. Smith, sales manager, Universal Portland Cement Co., Chicago; "The Price-cutting Manufacturer," A. A. Breed, president, Crane & Breed Mfg. Co., Cincinnati; "Driving vs. Leading," Harry Tipper, the Texas Co., New York; "Making the Sale Produce a Profit," J. C. Walker, educational division, Burroughs Adding Machine Co., Detroit; "Salesmanship from the Standpoint of the Employer," Morris W. Ellis, Ellis Shoe Co., Nashville.

The selection of the next convention city was left to the executive committee, but an expression of sentiment by the convention seemed to favor Philadelphia, which was well represented by official spokesmen.

For their work before and during the convention Awards of Merit were given. These consisted of small diamond-set insignia for the lapel. The winners were Woodrow Wilson, Norval A. Hawkins, Hugh Chalmers, Harry M. Jewett, Lee Anderson, Harry W. Ford, D. M. Barrett, Joseph Mack, W. C. Standish and Walter C. Cole, the latter secretary of the Detroit Board of Commerce.

Kansas City Sales Gain 50%

Crops and Business Conditions Are Excellent—City Business a Feature

KANSAS CITY, MO., July 17—June was a record-breaking month in the automobile business in the Kansas City district. Branch houses, agencies and dealers report trade 25 to 50 per cent ahead of the same month last year, and the 6-month period to have shown a constantly increasing ratio of gain since Jan. 1.

"June has been 100 per cent better than any June in the past," said H. A. Clark, sales manager of the Missouri Haynes Co., covering Kansas, Oklahoma and half of Missouri. "The first 6 months of this year have been 50 per cent better than any previous first 6 months. More cars have been sold in the Winter and Spring months by 100 per cent than in previous years in this territory."

The gain is attributed to the constantly improving dealers' organization in the territory, Kansas and Missouri.

The Greenlease Motor Car Co., handling the Cadillac exclusively, in Northern Kansas and Western Missouri, also reports a 50 per cent increase in June, despite the handicap on the country business due to rains and floods. The gain was, therefore, chiefly in city trade.

Outlook Is Promising

There is a general expectation of increased trade for the future borne out in the report of the Federal reserve bank, for June. The rains that hindered sales, have brightened crop prospects for wheat, insect damage has not increased, and the total crop of Kansas looks nearer 100,000,000 bushels than 90,000,000, with the quality rather better than last year. The first alfalfa crops were heavy and of fine quality. There is an unprecedented stock of grain in storage. The corn has been seriously hindered in growth by wet weather—but hot days came just in time to give the crop growth. The labor situation is causing some uneasiness, both as to crop work and in the city, where strikes are holding up many buildings, some of them needed larger quarters for automobile and tire firms.

Kansas City's bank clearings gained nearly $230,000,000 for the first 5 months—a gain of $52,052,236 in June makes the total advantage of 1916, first 6 months, over 1915, $279,974,491. Postal receipts show a gain of well towards $200,000, for the 6-month period. The live stock industry is more prosperous for the time being than ever in its history, says the report of the Federal Reserve bank. Kansas City showed the largest gain in receipts, reports available later than that of the bank being that the gain was 30 per cent over June, 1915.

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Bower Declares 15 per Cent Dividend

DETROIT, MICH., July 13—The directors of the Bower Roller Bearing Co., this city, met on Tuesday and declared a 15 per cent cash dividend as the regular quarterly dividend.

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Material Prices Lower

NEW YORK CITY, July 17—Despite a shortage of raw materials for the manufacture of automobiles, prices are remaining for the most part unchanged or lower. The metals, especially, are lower, as is also rubber. The latter is now coming into this country in large lots.

Twenty carloads of crude rubber, a solid trainload, valued at $1,000,000, are on their way to this city from San Francisco via the Southern Pacific's Ogden route. This shipment, which came from Singapore, is the first consignment of rubber of such magnitude to go overland from the Pacific Coast. It was shipped here by the East Asiatic Co. on its steamer Bried. Exports of crude rubber to this country from Para, Manaos and Brazil, for the month of May, amounted to 5,693,929 lb.

The most important drop of the week in the metals was that of Bessemer Steel, which went down $2 per ton to $40 on Thursday.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum, lb.	.58	.58	.58	.58	.58	.58	...
Antimony, lb.	.15½	.15½	.15½	.15½	.15½	.14½	— .01
Beams and Channels, 100 lb	2.67	2.67	2.67	2.67	2.67	2.67	...
Bessemer Steel, ton	42.00	42.00	40.00	40.00	40.00	40.00	—2.00
Copper, Elec., lb	.26½	.26½	.26½	.26½	.26½	.26½	...
Copper, Lake, lb	.26½	.26½	.26½	.26½	.26½	.26½	...
Cottonseed Oil, bbl.	10.50	10.70	10.75	10.60	10.55	10.50	...
Fish Oil, Menhaden, Brown, gal	.55	.55	.55	.55	.55	.55	...
Gasoline, Auto, bbl.	.24	.24	.24	.24	.24	.24	...
Lard Oil, prime, gal.	1.10	1.10	1.10	1.10	1.10	1.10	...
Lead, 100 lb.	6.40	6.40	6.40	6.35	6.35	6.35	— .05
Linseed Oil, gal.	.69	.69	.69	.69	.69	.70	+ .01
Open-Hearth Steel, ton	42.00	42.00	42.00	42.00	42.00	42.00	...
Petroleum, bbl., Kans., crude	1.55	1.55	1.55	1.55	1.55	1.55	...
Petroleum, bbl., Pa., crude	2.60	2.60	2.60	2.60	2.60	2.60	...
Rapeseed Oil, refined, gal.	.92	.92	.92	.92	.92	.92	...
Rubber, Fine Up-River, Para, lb.	.68	.68	.68	.68	.68	.66¾	— .01¼
Rubber, Ceylon, First Latex, lb.	.59	.58½	.58½	.58½	.58½	.58	— .01
Sulphuric Acid, 60 Baume, gal.	3.00	3.00	3.00	3.00	3.00	3.00	...
Tin, 100 lb.	38.50	38.75	38.50	38.63	38.63	38.00	— .50
Tire Scrap, lb.	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	...

$3,000,000 Capital for Portage

New Financing Plan Adopted at Meeting of Tire Concern Stockholders

AKRON, OHIO, July 13—A new plan of financing with an increased capitalization was adopted by stockholders of the Portage Rubber Co. meeting in Barberton on Tuesday. The present capitalization of $1,250,000, of which $500,000 is in common and $750,000 in preferred, will be increased to $3,000,000, placing $1,000,000 in preferred and $2,000,000 in common.

Of the preferred $250,000 will be offered to the present stockholders on a pro rata basis. The stockholders also voted to amend the constitution of the corporation so that the present issue of a million preferred may be convertible into common shares up to July 1, 1917.

A common dividend has been declared of 2 per cent, quarterly, payable Aug. 15 to stockholders of record Aug. 5.

One million of common will be set aside for exchange purposes. Common stock in the Portage corporation pays 8 per cent and the preferred 7 per cent.

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Overland Declares 10% Stock Dividend

TOLEDO, OHIO, July 13—The directors of the Willys-Overland company yesterday declared a regular quarterly dividend of 3 per cent in cash, placing the regular dividend on a 12 per cent per annum basis. The directors also declared an extra stock dividend of 10 per cent.

The cash dividend is payable Aug. 1 to holders of record July 24. One half of the 10 per cent stock dividend is payable Oct. 2 to holders of record Sept. 15. The remainder is payable April 2 to holders of record March 15.

After the meeting President J. H. Willys stated that orders received last week for immediate shipment amounted to over 10,000 cars. Business was never better than at present. During the 6 months ended June 30, 1916, the number of cars sold and delivered was 94,477, being two and one-half times the shipments in the corresponding period of 1915.

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Geiger-Jones Offering New Issue of Preferred

LIMA, OHIO, July 13—The Geiger-Jones Co., which controls the stock of the Gramm Motor Truck Co. of Lima is offering for sale a limited amount of the ne wissue of preferred 7 per cent cumulative stock at 101. The issue was

authorized at a meeting June 17 by more than 80 per cent of the stockholders of record.

In the statement issued with the call for stock subscriptions, the company is shown to have had profits of $579,000 in 1915 after making deductions for depreciation and other charges. In other words the profits were sufficient to pay the preferred dividends and 66.4 per cent on the common stock outstanding at the end of the year. The dividends on the preferred are payable quarterly, in January, April, July and October. The stock is non-taxable in Ohio. The business of the company in 1915 amounted to more than $4,000,000

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Packard Motor Car Earnings Estimated at $6,050,000

DETROIT, MICH., July 17—The Packard Motor Car Co., this city, has just issued a statement of its earnings since 1909. The company that year earned $2,612,774 and it expects to earn for 1916 about $6,050,000.

The figures for the fiscal year of 1915-1916 contain a conservative estimate covering the last quarter of the year; and after paying regular preferred and common cash dividends and deducting the 10 per cent common stock dividend distributed Feb. 1, 1916, and the 50 per cent common stock dividend to be distributed Aug. 1, 1916, the balance in surplus account at the end of the year is expected to exceed $6,376,344. This is after deducting depreciation aggregating for 7 years more than $9,000,000.

Security Prices Lower

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Chandler, General Motors, Chalmers and Firestone Stronger

NEW YORK CITY, July 18—Automobile securities on the New York Stock Exchange and the Curb were under attack yesterday by traders with a general decline. Overland went down 3 points, as did Maxwell, Chevrolet and Studebaker.

Some of the stocks, however, showed unusual strength, despite the bear attack. Firestone reached 915, or a gain of 35 points. This company has just issued a financial statement showing net gain in business of 38 per cent. General Motors, with a gain of 15 points for the week, was also strong. Chevrolet, however, which was subject to much selling during the week, dropped 34 points to 194.

The bearish action of the traders is unexplainable at the present time, as most of the companies are showing excellent earnings.

Initial transactions were made yesterday in the stock of the recently organized Mitchell Motors Co. The first sale was made at $67.50. Subsequently there was an advance to $68, followed by a 2-point decline.

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$5,000,000 Earnings for Canadian Ford

WALKERVILLE, ONT., July 15—The net earnings of the Ford Motor Co. of Canada, Ltd., for the current fiscal year of 10 months, ending July 31, show approximately $5,000,000, which would be equivalent to about $70 a share on the $7,000,000 outstanding capital. From these earnings, however, will be deducted the Canadian war tax.

The company has spent $2,750,000 in erecting four new assembling plants and other extensions to the Ford, Ont., plant, which additions give 162,000 sq. ft. more floorspace.

The new Canadian assembling plants are located at Montreal, Toronto, London, and Winnipeg.

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Firestone Sales Increase 38 Per Cent

AKRON, OHIO, July 17—Since 1910-11, when the Firestone Tire & Rubber Co. moved into the new factory, the sales have grown from $7,462,581.17 to $25,187,884.33, making a total increase of 257 per cent for the past 5 years. This past year, 1915-16, the increase to June 1 was 38 per cent over the showing of last year.

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Dividends Declared

Kelly-Springfield Tire Co.; quarterly of 4 per cent on common, payable Aug. 1, to stockholders of record at the close of business July 17.

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Ledwitch Joins Maxwell

DETROIT, MICH., July 13—C. J. Ledwitch, who has had extensive experience with the foreign trade, has joined the staff of the export department of the Maxwell Motor Co.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Ajax Rubber Co. (new)	..	..	63½	65½	—1
J. I. Case pfd	70	79	82	90	..
Chalmers Motor Co. com	91	93	165	175	+8
Chalmers Motor Co. pfd	95½	98½	98	100	..
*Chandler Motor Car Co.	..	..	103½	105	+6½
Chevrolet Motor Co.	..	..	194	198	—34
Fisk Rubber Co. com	..	..	..	160	..
Fisk Rubber Co. 1st pfd	..	..	112	120	—2
Fisk Rubber Co. 2d pfd	..	..	112	120	—8
Firestone Tire & Rubber Co. com	506	512	915	930	+35
Firestone Tire & Rubber Co. pfd	109	111	111	113	—1
*General Motors Co. com	188	189	485	490	+15
*General Motors Co. pfd	104	105½	109½	113	— ½
*B. F. Goodrich com	50	52	72⅞	73⅛	—1⅛
*B. F. Goodrich pfd	104	105½	113½	113⅝	+ ⅜
Goodyear Tire & Rubber com	270	273	223	226	—2
Goodyear Tire & Rubber pfd	105½	107	106	107	+1
Grant Motor Car Co.	..	..	9	11	—2
Hupp Motor com	..	..	7	7½	— ½
Hupp Motor pfd	..	..	80	110	..
International Motor Co. com	17	19	7	9	..
International Motor Co. pfd	43	45	18	23	..
*Kelly-Springfield Tire & Rubber com.	155	157	68	69	—1
*Kelly-Springfield Tire & Rub. 1st pfd.	85	87	95	97	— ⅜
*Lee Rubber & Tire Corp.	..	..	42½	43½	—3⅞
*Maxwell Motor Co. com	36	38	73¾	74	—4¼
*Maxwell Motor Co. 1st pfd	83	85	84	85	— ½
*Maxwell Motor Co. 2d pfd	32	34	54½	55	+ ½
Miller Rubber Co. com	190	192	200	215	—25
Miller Rubber Co. pfd	103	105	104	106	..
Packard Motor Car Co. com	110	115	..	177	..
Packard Motor Car Co. pfd	96½	100	100	104	..
Paige-Detroit Motor Car	..	..	..	48	..
Peerless Truck & Motor Corp.	..	..	22	24	—2
Perlman Rim Corp.	..	..	..	..	..
Portage Rubber Co. com	35	38	113	115½	—4
Portage Rubber Co. pfd	92	95	115	117	—3
Regal Motor Co. pfd	..	..	17	22	..
Reo Motor Truck Co.	15	16	36¼	37	— ¼
Reo Motor Car Co.	29½	31	42½	43	— ½
Saxon Motor Car Co.	..	..	77	79	—2
Standard Motor Co.	..	..	5	6	..
Stewart Warner Speed. com	66	67½	98	100	—2
Stewart Warner Speed. pfd	104	106	..	..	..
*Studebaker Corp. com	81	83	124⅝	125	—8
*Studebaker Corp. pfd	99	101	109	110	—1
Stutz Motor Corp.	..	..	60	61	—3
Swinehart Tire & Rubber Co.	77	78	85	87	—1
United Motor Corp.	..	..	65⅜	65¾	—6
*U. S. Rubber Co. com	45	47	52½	53½	..
*U. S. Rubber Co. pfd	103	105	107¾	108¼	—2⅜
White Motor Co. (new)	103	108	52½	53	—1¾
*Willys-Overland Co. com	137	139	64¼	64¾	—1½
*Willys-Overland Co. pfd	102	103	105	107	—2

Quotations furnished by John Burnham & Co.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

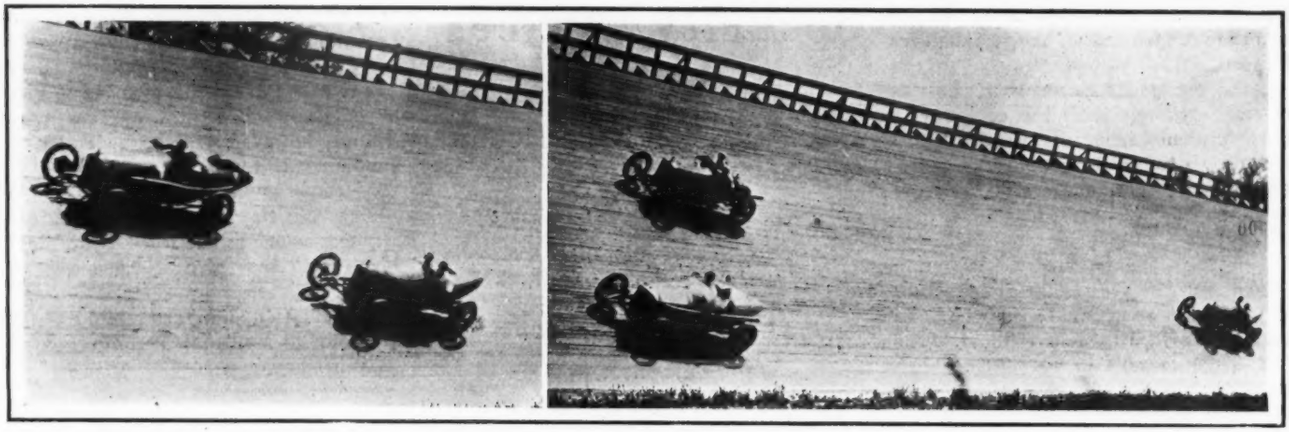
ACTIVE STOCKS

	1915 Bid	1915 Asked	1916 Bid	1916 Asked	Wk's Ch'ge
Auto Body Co.	..	..	..	37	..
Chalmers Motor Co. com	..	92	..	185	..
Chalmers Motor Co. pfd	94½	97	98	..	+2
Continental Motor Co. com	195	..	..	37	..
Continental Motor Co. pfd	82	84	9½	10½	..
Ford Motor Co. of Canada	1350	..	..	360	..
General Motors Co. com	187	192	480	510	+10
General Motors Co. pfd	104	105½	..	112	..
Maxwell Motor Co. com	36	38	73½	76½	—4
Maxwell Motor Co. 1st pfd	82½	84½	83	86	—1½
Maxwell Motor Co. 2d pfd	33½	36	53	56	—2
Packard Motor Car Co. com	110	115	..	178	..
Packard Motor Car Co. pfd	96¼	..	..	104	..
Paige-Detroit Motor Car Co.	..	..	..	50	..
*W. K. Prudden Co.	19½	21	44	46	+4
*Reo Motor Car Co.	30	31	42⅝	44	+ ⅛
*Reo Motor Truck Co.	15¼	16	..	37	..
Studebaker Corp. com	81	83	125	127½	—7
Studebaker Corp. pfd	99	101	105	..	..
C. M. Hall Lamp Co.	..	..	..	32	..

INACTIVE STOCKS

*Atlas Drop Forge Co.	..	26	..	40	..
Kelsey Wheel Co.	205	..	..	350	..
Regal Motor Car Co. pfd	..	25	17	..	..

*At close July 17, 1916—Listed New York Stock Exchange.



Left—Mulford's Peugeot and Vail's Hudson on the east turn in the 150-mile race. Right—De Palma's Mercedes, Hughes' Delage and D'Alene's Duesenberg sweeping around the same turn

Resta Wins Omaha 150-Mile Race

His Peugeot Averages 99.02 M.P.H., a Record—DePalma Takes 50-Mile at 103

150-MILE RACE

Car	Driver	Time	M.P.H.	Prize
Peugeot	Resta	1:30:43.88	99.02	$3,000
Peugeot	Mulford	1:31:56.24	98.39	1,000
Duesenberg	Milton	1:32:32.25	97.30	600
Maxwell	Henderson	1:40:06.27	90	400

50-MILE RACE

Mercedes	De Palma	29:02.47	103.45	$1,200
Maxwell	Rick'nb'her.	30:01.65	99.89	600
Maxwell	Henderson	30:07.16	99.61	400
Crawford	Lewis.	31.37.10	94.89	300

OMAHA, NEB., July 15—Under the hottest sun that has shone on a race in many years, Dario Resta drove his blue Peugeot to victory in Omaha's second annual automobile derby, nosing out Mulford, who had been looked upon as a likely winner until almost the end of the race. His time for the 150 miles was 1:30:43, an average of 99.02 m.p.h., a record for 150 miles on a 1¼-mile track. Mulford finished 1 min. and 13 sec. later, averaging 98.39 m.p.h. He also won the $100 prize for the fastest lap.

Don Columbo, mechanic for Franchi in the Peusun, was killed when they went through the safety wall in front of the grandstand.

Resta jumped into the lead in the first lap but was crowded close by Mulford and Rickenbacher, Mulford heading Dario before ten laps were made. The Omaha track has not stood up as one would expect. The 2 by 4's have split and there are many ruts, some as much as 2 in. deep.

On his tenth lap Franchi tore down the homestretch at 100 m.p.h. or more. Immediately in front of the pits he struck the ruts in the track, the front of his car swerved toward the grand stand, he tried to right it, then the rear end turned clear around and the whole car hit the wall broadside, tearing down 100 ft. of the wall and dropping 15 ft. into the space between the track and the grandstand. Had the car been stood on one end and a pile driver put on the other the damage to it hardly could have been worse. At a casual glance it was hard to tell the front from the rear, so badly was it damaged.

Flying planks and splinters injured a few slightly in the stands and the track was literally covered. The course was exceedingly dangerous for the other drivers but the debris was cleared away between the passing of cars.

At 20 miles Mulford led, Resta was second, Rickenbacher third, Gable fourth and Chandler fifth. The toll on tires was terrific. Mulford was forced to stop many times toward the end of the race, when seconds counted. Many of his changes were made in 20 to 25 sec.

Resta led at the end of the first hour, his speed being 101.37 m. p. h. He and Milton were the only ones who made no tire changes.

In the seventy-sixth lap Jack Gable drove the Burman Special, the same car in which Burman was killed at Corona last April and which is being campaigned for Burman's widow, through the fence and into the infield. The car turned over three times, but Gable and his mechanic, Harry McGraff, were thrown out on the first impact and escaped with a few bruises.

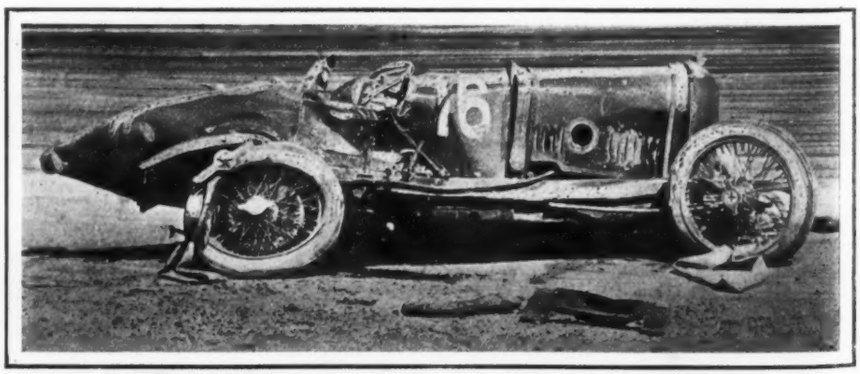
Before the race Mulford refused to let the Hudson Super-six go in. This left Vail without a mount, but Ralph finally was won over and Vail took the car. His ignition wires caught fire once, he changed mechanics once when his first mechanic was overcome by the heat, and then Vail used up all the tires he had and had to withdraw.

Rickenbacher went out at 101 miles with valve trouble. He was in third place at that time. De Palma was forced to withdraw soon after Rickenbacher came in, Ralph's trouble being a broken valve cap.

Seven Running at Finish

Only seven of the seventeen cars that started were running at the finish. They were Resta, Mulford, Milton, Kline, Muller, Henderson and Stringer.

In the 50-mile free-for-all that followed 30 min. after the finish of the big race, seven cars started, De Palma heading them all and winning at a speed of 103.45 m. p. h., his time being 29:2.47. Rickenbacher was second, Henderson third, Lewis fourth, Stringer fifth, Milton sixth and Rawlings' Duluth Special went out in the twenty-third lap with a



Wrecked Burman special, which turned over three times without injuring Gable or his mechanic. Bob Burman lost his life in this car at Corona in April

broken crankcase. Mulford's Hudson withdrew at the end of twenty-four laps with a burned-out bearing.

De Palma took the lead at the start of the race and showed much speed to the end. Rickenbacher put up a game fight but the Mercedes had plenty of reserve speed and held its own.

15,000 Spectators

About 15,000 people witnessed the races. The infield was thick with cars and the prejudice which resulted from the meager field of last year, when the date given Omaha was one day following Sioux City, where several cars were put out of the running to the disappointment of Omaha, was not in evidence to-day. Many predicted a repeat victory for Rickenbacher, but he did not make good.

The qualifying speeds of the different cars were exceedingly high. Ten of them were over 101 miles per hour.

Nearly every driver was exhausted from the excessive heat which registered over 104 deg. all afternoon. Resta could speak only with difficulty when he was helped from his car. The track was as hot as a stove and the pitch boiled out of it.

Resta's Big Lead

Winning to-day's race gives Resta 2,400 points toward the speedway championship and the $13,500 in money and a cup offered by Goodrich and Bosch. His lead is fairly safe at this time. De Palma would have headed Resta had he won to-day's race. To date he has made 1670 points with Rickenbacher third with 770 points.

The exact standing of competitors follows:

Driver	Points	Driver	Points
Dario Resta.	2400	C. J. Devlin	90
R. De Palma	1670	B. Oldfield	80
Rickenbacher.	770	Mel Stringer	55
Ralph Mulford.	595	George Adams.	55
J. Christiaens.	540	Earl Cooper	55
W. D'Alene	510	H. Wilcox	40
Pete Henderson	432	Billy Chandler.	40
J. Devigne	320	Bert Watson	35
John Aitken	320	M. Sorenson	35
Thomas Milton.	260	Chas. Johnson.	30
Ira Vail.	220	Jack Gable	30
E. O'Donnell	185	F. McCarthy	25
Dave Lewis	110	Ora Haibe	20
F. Galvin	100	W. J. Muller.	20

A view of the pits, showing how Resta protected his tires against the 104-deg. temperature before the race. He did not make a single stop for tire trouble

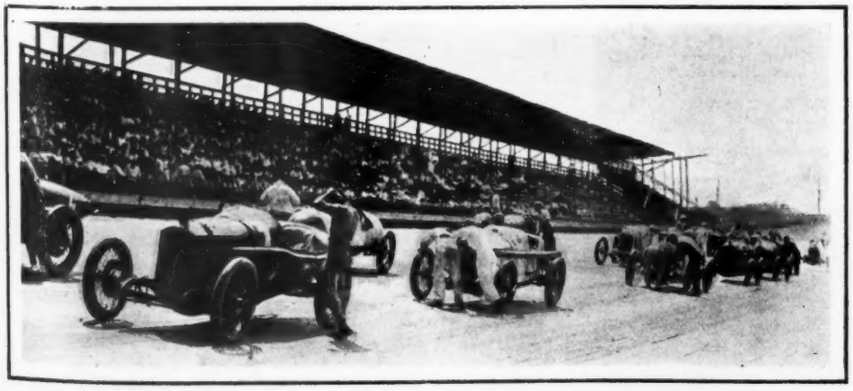
Elgin Road Race Postponed

Chicago Speedway May Get Aug. 19 for American Speedway Grand Prize

CHICAGO, ILL., July 17—Now that the Elgin road races for this year have been called off, it is practically certain that racing fans of the Central West will have an opportunity to experience the thrills of speed on the date set for the Elgin road races, Aug. 19. David F. Reid, president of the Speedway Park Assn., has wired to the American Automobile Assn. contest board for the Elgin date when the local speedway will stage the American Speedway Grand Prize, and it is practically certain that the request will be granted as such a promise is said to have been made by the contest board in case the Elgin races did not materialize.

A gold cup already has been ordered for the American Speedway grand prize and the entry blanks which have been printed will be sent out this week. Cars to qualify must average 100 m.p.h. or better, and the prize money will total $10,000 divided as follows: $5,000 for first, $2,500 for second, $1,250 for third, $750 for fourth and $500 for fifth. The conditions of the race are an innovation in speedway competition. Five heats, 20 miles each, and a 50-mile final will be run. The winner of each heat will qualify for the final and as soon as a driver wins a heat he steps aside, being assured a piece of the prize money even though he does not start in the final, since there are five prizes and cannot be more than five to start in the final dash. The cup will have to be defended each year.

Plans are under way for putting on a contest for the Elgin National Cup on the day following the American Speedway grand prize, but whether or not this will be done is a matter of conjecture at this time.



Line-up for start of 150-mile race at Omaha July 15. Resta and Mulford are in front with their Peugeots with De Palma's Mercedes and D'Alene's Duesenberg and the rest behind

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Fourteen Tacoma Entries to Date

TACOMA, WASH., July 14—The Tacoma Montamarathon race to be held Aug. 5 on the Tacoma Speedway will be for a distance of 300 miles, with a purse of $10,000 for the one event.

The track has already been placed in the best possible condition, a new guard rail completed for the entire course.

Entries are now coming in, and those who have signed blanks to date, are as follows:

Driver	Car
Rawlings	West-Duluth
Chandler	Crawford
Lewis	Crawford
Johnston	Crawford
D'Alene	Duesenberg
Milton	Duesenberg
Unnamed	Duesenberg
Devigne	Delage
Franchi	Delage
Moore	Hudson
Duray	Omar
Barsby	Hudson
Rickenbacher	Maxwell
Henderson	Maxwell

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To Enlarge Dodge Bros. Club

DETROIT, MICH., July 16—It has been intimated by John F. and H. E. Dodge that a new building is soon to be erected for the benefit of Dodge Brothers' Recreation Club, where the club may broaden the scope of its work and provide a permanent source of recreation for Dodge Brothers' workmen.

Factory Miscellany

To Make Exhaust Heater—David Reyam of Wilmington, Del., has invented and had patented a device for using automobile engine exhaust in heating the car space used by occupants in winter. While it can be applied in various ways, the chief thought is to heat the entire interior of a closed car, while in cars that are not entirely enclosed, the source of heat is to be at the feet of the occupants, coming up under blankets or such other covering as they may have for protecting their limbs from the cold.

The device does not take the direct heat of the exhaust, but has it passing between coils containing air, which, after being heated, is discharged in the car at the points desired. It is claimed to be so adjustable that the temperature can be regulated to any heat desired, also that the heat can be quickly generated.

It is the intention, Mr. Reyam says, to manufacture the device in Wilmington. He says it is economical in cost and maintenance and is durable.

Stafford Still Making Parts—The Stafford Motor Car Co., Kansas City, Mo., which in 4 years made 500 cars, ceasing manufacture 2 years ago, continues to make parts, at its factory; the plant, however, is chiefly occupied with a large volume of repair work for all kinds of cars, the calls upon the equipment being largely in excess of the capacity.

Tire Plant for South Bend—South Bend, Ind., is to have a new tire plant. The International India Rubber Corp., incorporated last fall for $1,000,000, is to erect the plant, in which tires and tubes will be manufactured. P. E. Studebaker is president of the company, and the other officers are: Vice-President, E. H. Schwab; treasurer, T. W. Slick; secretary, G. W. Odell. The company is establishing branches in various parts of the country.

Chevrolet Assembling Plant in S. W.—The Chevrolet Motor Co. of Texas, Fort Worth, will build an assembling plant. The site which has been under consideration for several months is a 7-acre tract west of Trinity Park and south of the Arlington Heights Boulevard. The building plans provide for a structure of three stories, the foundation of the building measuring 275 by 375 ft.

Splitdorf Engine Co. Formed—The Splitdorf Engine Co., Augusta, Me., has been incorporated to deal in motors and generators, with a $200,000 capital, by R. S. Buzzell, president; L. J. Coleman, treasurer, and C. L. Andrews.

200 Canadian Fords a Day—Production of the Ford Motor Co. of Canada is now running at the rate of 200 cars a day and plans are under way to increase the daily output to 250 cars in the next few months.

From Oct. 1, 1915, to the middle of June, this year, the company produced 31,500 cars. The current fiscal period will include only 10 months, as the company's year has been changed to begin Aug. 1 instead of October. Next year's production is estimated at 60,000 cars.

The company has spent about $2,750,000 in erecting four new assembling plants, extensions to the Ford, Ont., plant, additions to the power plant at that place, a new machine shop, office buildings and installation of new machinery.

Auto Body to Increase Force—The Auto Body Co., Lansing, Mich., which now has about 750 men on its payroll, expects to employ at least 1400 within the next 30 days, when additions to the plant will be completed.

The working force of the Gier Pressed Steel Co., this city, is to be increased from 500 to about 750.

Hester Tire to Build—Three acres of land, lying between the C. H. & D. tracks and Jefferson Avenue, Lima, Ohio, have been obtained by the Chamber of Commerce as a site of the new factory to be built by the Hester Tire & Rubber Co. Plans for the main factory building, 60 by 150 ft., and a power house, 60 ft. sq., are nearing completion. According to the company officials work will be started on the buildings within a short time and machinery will be installed before early fall.

The Hester Tire & Rubber Co. is a $100,000 concern, incorporated under the laws of Delaware and at present doing a general rubber jobbing business. One hundred men and girls will be employed at the start, and the force will be increased later, it is said.

The Automobile Calendar

ASSOCIATIONS

Sept.—Indianapolis, Convention for Formation of Indiana Automobile Trade Assn., under auspices of N. A. T. A., Hotel Claypool.
Oct. 2-5—St. Louis, Fall Meeting Assn. of Automobile Accessory Jobbers.
Dec. 2-9—Electricians' Country-wide Celebration.

CONTESTS

July 22—Kansas City, West Speedway Race, Kansas City Speedway Co.
July 22—Oriskany Falls, N. Y., Hillclimb, Auto Club of Utica.
Aug. 5—Tacoma Speedway Race, Tacoma Speedway Association.
Aug. 11-12—Pikes Peak, Col., Hill Climb, Pikes Peak Auto Highway Co.
Aug. 12—Portland, Ore., Track Race, Hiller-Riegel Co.
Aug. 18-19—Elgin Road Race, Chicago Auto Club.
Aug. 26—Kalamazoo, Mich., 100-Mile Track Race.
Sept. 1-2—New York, N. Y., Sheepshead Bay Speedway, 24-Hour Race, Trade Racing Assn.
Sept. 4—Elmira, N. Y., Track Race, Elmira Auto and Motorcycle Racing Assn.
Sept. 4—Cincinnati, Ohio, Speedway, Cincinnati Speedway Co.
Sept. 4—Newark, N. J., Track Race, Olympic Park, Racing Assn.
Sept. 4—Indianapolis Speedway Race.
Sept. 4—Des Moines Speedway Invitation Race. Limited to six entries.
Sept. 4-5 — Spokane, Wash., Track Race, Inland Auto Assn.
Sept. 16—Providence Speedway Race.
Sept. 18—North Yakima, Wash., Track Race, Washington State Fair.
Sept. 29—Trenton, N. J., Inter-State Fair. H. P. Murphy, Racing Sec.
Sept. 30 — New York City, Sheepshead Bay Speedway Race.
Oct. 7 — Philadelphia Speedway Race.
Oct 7—Omaha Speedway Race.
Oct. 14—Chicago Speedway Race.
Oct. 19—Indianapolis, Ind., Race Indianapolis Motor Speedway.
Oct. 21 — Kalamazoo, Mich., Track Races, Kalamazoo, Motor Speedway.
Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.

GOOD ROADS

Sept. 6-7—St. Paul, Minn., Good Roads Congress, Auditorium.

SHOWS

Aug. 2-9—Hollywood and West End, N. J., Show, Atlantic Exhibition Co.
Sept. 2-9—Columbus, Ohio, Fall Show, Ohio State Fair, Columbus Automobile Show Co.
Sept. 4-11—Indianapolis, Ind., Show, Indiana State Fair, Indianapolis Automobile Trade Assn.
Sept. 10-16 — Milwaukee, Wis., Show, Wisconsin State Fair, Machinery Bldg.
Jan. 6-13, 1917—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.
Jan. 27-Feb. 3, 1917—Chicago, Ill., Show, Coliseum, National Automobile Chamber of Commerce.

TRACTOR

July 17-21—Dallas, Tex., Tractor Demonstration.
July 24-28—Hutchinson, Kan., Tractor Demonstration.
July 31-Aug. 4—St. Louis, Mo., Tractor Demonstration.
Aug. 7-11—Fremont, Neb., Tractor Demonstration.
Aug. 14-18—Cedar Rapids, Iowa, Tractor Demonstration.
Aug. 21-25—Bloomington, Ill., Tractor Demonstration.
Aug. 28-Sept. 1—Indiana Tractor Demonstration.
Sept. 4-8—Madison, Wis., Tractor Demonstration.
Sept. 11-16 — Milwaukee, Wis., Fall Show, Wisconsin State Fair. Milwaukee Automobile Dealers.